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14. ABSTRACT This final report delivers the CONOPS in compliance with the statement of work. Deloitte Consulting LLP, in support of Department of Combat Medic Training (DCMT), conducted research, designed and developed a technical solution to digitize and integrate forms-based testing and training documents into the 68W Training Program over a three year period. The CONOPS document enclosed in this report fulfills the requirements for submitting documentation outlined in the final statement of work for this research and pilot program.					
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REPORT INTRODUCTION

Deloitte is under contract W81XWH-07-C-0115 Department of Combat Medic Training – Technology Enhancement to the U.S. Army Medical Research & Materiel Command's (USAMRMC) Telemedicine & Advanced Technology Research Center (TATRC). During the contract period Deloitte was purchased by Deloitte. There were no project impacts due to this action.

The Department of Combat Medicine Training Technology Enhancement (DCMT) team is tasked with conducting the research, design, and analysis of a technical solution to digitize and integrate forms-based testing and training documents into the Army’s 68W Training Program). Specific areas of interest were the digital conversion of paper to electronic forms, and two-way secure wireless synchronization of the tablets and central servers managing the data.

BODY



**Department of Combat Medic Training –
Technology Enhancement
Final Report
CONCEPT OF OPERATIONS**

W81XWH-07-C-0115

Final Phase II Report

15 April 2011

Deloitte.

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1 Executive Summary

1.1 Approach

Deloitte is under contract W81XWH-07-C-0115 Department of Combat Medic Training – Technology Enhancement to the U.S. Army Medical Research & Materiel Command's (USAMRMC) Telemedicine & Advanced Technology Research Center (TATRC). The DCMT project team created this Concept of Operations (CONOPS) document to details the entire project's research, design, testing and pilot efforts for integrating an automated testing solution into the training program for combat medics.

1.2 Exemption from Research Protocol

This project was determined to be exempt from IRB protocol per Appendix

1.3 What this report says:

Section 1 – Executive Summary:
(this section)

Section 2 – Introduction:

This section of the CONOPS provides a high-level overview of the project including problem statements and setting.

The Department of Combat Medicine Training Technology Enhancement (DCMT) team is tasked with conducting the research, design, and analysis of a technical solution to digitize and integrate forms-based testing and training documents into the Army's 68W Training Program). The specific area of interest was the digital conversion of paper to electronic forms, and two-way secure wireless synchronization of the tablets and central servers managing the data.

Section 3 – Current State:

This section provides detail of the current process including the manual and automated system(s) in use, description of environment, definitions, modes of operation, user classes and roles, and a description of the current support environment. Analysis of these current process and system details is described for the purpose of determining future alternatives.

The current process (at initiation of the project) was a tedious, slow manual process involving paper-based checklists filled out by an instructor as each student performs lifesaving procedures in a number of clinical scenarios. The completed checklist was hand-delivered by runners to a group of evaluators in a separate location, where the exam was scored. There were several disadvantages identified to be addressed by the project including delays in the process and the inability for course managers to receive real-time reports of student performance. The manual process also required a large group of soldiers to be used as runners.

Section 4 – Future State Strategy:

This section of the DCMT CONOPS describes the case for change; provides a recommended plan of action based on the findings of the analysis of current system. The analysis of current system details is merged with research into the potential alternative solutions. Recommendations were developed from this analysis and are described in this section

The specific area of interest identified was the digital conversion of paper to electronic forms, and two-way secure wireless synchronization of a tablet device, and central servers managing the data. Applied research and analysis of the department's business processes and functional requirements will be more thoroughly understood for the purpose of influencing possible new designs of functionality that can be developed within the 68W program.

Recommendations for a tablet-based wireless solution were developed based on the following projected benefits:

1. Increased efficiency:
 - a. reduced paper use and associated storage and management cost
 - b. free up manpower used as runners
 - c. instant scoring/feedback including details for corrective assistance
 - d. decreased time required for overall testing process
2. Increased accuracy
 - a. legible capture of instructor comments
 - b. validation of input prior to submission
 - c. import of student demographics
3. Administrative simplification
 - a. enable automated management of performance indicators
 - b. web-enabled access
 - c. automated synchronization of TEMTPC and EMT Web Portal
 - d. digital data sharing capability
4. Enhanced data security
 - a. encryption during testing process during transfer between instructor to evaluator
 - b. encrypted storage
 - c. encryption for transfer

Section 5 – Work Plan:

This section contains a timeline showing the milestones and deliverables in sequential fashion for both phase I and phase II.

Section 6 – Concepts of the Pilot System:

This section displays and explains UML activity diagrams and use case descriptions.

Section 7 – Summary of the Pilot Build out:

This section provides details of the components used in the pilot project. The pilot was built around three components and their installed software:

- Tablet PC
- Laptop Console
- Central Server

Section 8 – Pilot Operation and Test Results

This section contains findings from the pilot's operational use gathered during the testing phase to include a comprehensive listing of fixes, changes and enhancements identified or requested during interaction with staff on site at the pilot.

Section 9 – Conclusion

This section outlines the measured impact of transitioning from the current state to the new concept piloted by providing the strategy map, listing of performance results and general comments and recommendations to address both future operations in the 68W training program and expanding the use of this or similar technology into other areas.

The performance results measured include a significant reduction in paper documents being stored and processed (paper forms for 10,000 exams provided per year), reduction of over 1900 man-hours per year, and a 30% reduction in overall time for testing).

2 Introduction

The “68 Whiskey” (68W - Combat Medic) military occupational specialty is the second-largest specialty in the Army, with nearly 38,000 medics spread across the active and reserve components. The Department of Combat Medic Training (DCMT) trains 8,000 new medics a year, with class sizes that stretch to nearly 500 students. A new iteration of training starts every two weeks, and at any one time, as many as 2,500 students are working their way through the program.

This project was approved to focus on improving a specific element of the 68W training program- the All Skills Practical Exam (PE) required by the National Registry of Emergency Medical Technicians (NREMT).

2.1 Document Overview

2.1.1 DCMT CONOPS Objective

The DCMT project team created this Concept of Operations (CONOPS) document to detail the entire project's research, design, testing and pilot efforts for integrating an automated testing solution into the training program for combat medics. It serves as the final report for the project, and as a source of recommendations for application of the solution evaluated and tested by the project team.

2.1.2 Audience

- MHS end users
- Potential partners and stakeholders for follow-on phases
- Developers
- Medical Treatment Facilities
- Training Site Cadre`

2.1.3 Expected evolution of the CONOPS

The DCMT CONOPS will provide the background and fundamental concepts as basis for next steps for MHS implementation/sustainment activities. This is the final report for the project, and as such, this document is not scheduled for future revision by the current project team, however it is possible that changes could take place during the eventual system development process that will require subsequent revisions, including potential change(s) in policy or overall system requirements.

2.1.4 Revision History

Version	Description of Change	Author	Date
1	Final Report	Raman Singh	4/15/2011

2.2 Project Overview

The DCMT technology enhancement project was tasked with research, design, and development of a technical solution that provides digitized forms and integrated testing and training documents for the 68W training environment. Solution design resulted in a pilot, which was adopted by DCMT and continues to be utilized. Hardware purchased was set up in the operational environment and will remain on site for use after project termination.

2.2.1 Problem Summary

An inefficient manual paper-based process was being used to evaluate performance of students taking a practical exam. Paper forms required storage space and the storage and retrieval process was labor intensive. Transport of the forms during testing was also manual, introducing potential for loss or breach of data security. The process required manual entry of demographic data, leaving room for error in reading hand-written entries, and requiring time to validate completeness of data entry. Management of performance indicators for the instructors themselves was also manual.

2.2.2 Approach

This project included:

- Performance of current state analysis and industry research to identify industry best practices and trends to determine suitable solution set to provide increased efficiency for the evaluation process
- A pilot of the solution including design, development, testing and deployment of the solution set in an operational setting
- Compilation of recommended options for reaching the desired future state including recommended situations that could benefit from the project's findings
- Action on findings within scope and budget
- Final report

2.2.3 DCMT Technical Enhancement Project Objective

During this study, the Deloitte team, working with the Department of Combat Medic Training (DCMT), conducted research necessary to design and develop a technical solution to digitize and integrate forms-based testing and training documents into the 68W Training Program.

This research was focused on a sample group of students and instructor(s), not the service members themselves (This is not a human study). The population was determined from students and instructors who participate in 68W exercises. The specific areas of interest were the digital conversion of paper to electronic forms, and two-way secure wireless synchronization of the tablet, and central servers managing the data. Applied research and analysis of the department's business processes and functional requirements will be more thoroughly understood for the purpose of influencing possible new designs of functionality that can be developed within the 68W program or in similar environments.

2.2.4 DCMT Technical Enhancement Project Scope

The scope of phase I of this project was to conduct a study to define and test forms automation and process re-design. Phase II expanded the initial findings to demonstrate the concept in a pilot that includes providing hardware and training necessary to automate practical exams for the 68W training program.

The project:

- Provided 70 programmed tablets to DCMT to be used by instructor/evaluators to enter notes on student progress as they work through a simulated event
- Designed, loaded and tested customized forms software on the tablets to emulate forms being used for testing to allow simplified data entry
- Provided 1 laptop with the console application for use by the course coordinator to view and manage test results, reports, manage testing process to include instructor performance measures
- Provided 2 laptops with server/storage capacity for automated synchronized back-up and additional data management capability
- Designed and implemented a web portal allowing the data to flow between elements within the network established
- Provided training to staff for use of the components
- Evaluated the use of the components in a test environment, then an operational environment
- Collected and acted upon feedback from participants in the pilot to maximize the utility of the system

3 Current State

3.1 Background

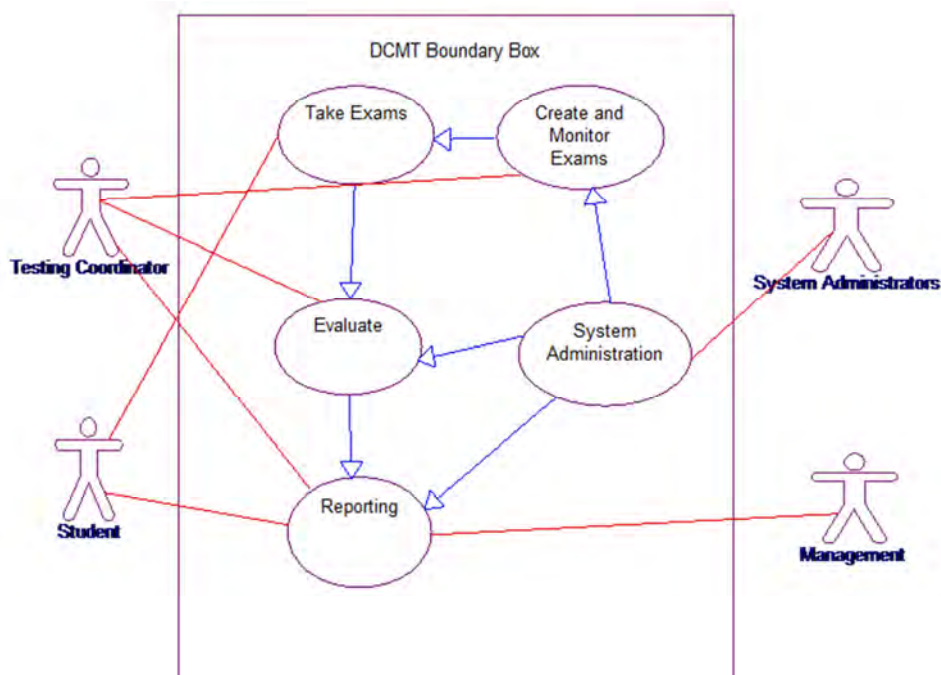
The training provided at DMT includes the All Skills Practical Exam (PE) required by the National Registry of Emergency Medical Technicians (NREMT). The EMT PE was established to ensure each soldier at the Department of Combat Medic Training is competent in thirteen separate skills trained from the 68W EMT-Basic curriculum. The PE consists of six skill stations; five mandatory stations and one random skill station.

3.2 Description of Current Process

The current process for the PE was a tedious, slow manual process:

Each student was required to perform lifesaving procedures in a number of clinical scenarios. Using paper-based checklists, an instructor evaluated each student's performance in a scenario. The instructor begins the PE by reading the scenario to each student, and then each student performs timed simulated lifesaving procedures on a fellow student who is acting as the casualty.

At the end of the scenario the instructor handed the graded checklist to a runner who in turn walked this checklist to a group of evaluators in a separate location. If the student has passed, all is well. If the student has not passed that station, he must return later and redo that particular clinical scenario. The student who has failed the scenario is not provided feedback as to why he failed. He simply has to repeat the entire scenario. The use case diagram below documents the current process.



3.3 Operational Environment

The EMT PE skill stations are remote from the normal classroom training environment – at a location that simulates disaster and wartime scenarios. The course evaluators that are monitoring student progress are limited to recording progress based on a check-sheet with an optional free-text feedback section to document notes on student behavior related to the score given. Students are not provided feedback during the exam.

4 Future State Strategy

4.1 Problem definition

As hundreds of students queue for the Practical Exam, there are many delays in the process and students spend a great deal of time just waiting for their turn in the next station. The manual method did not allow course managers to receive real-time reports of students' performance. Also, a large group of soldiers were used as runners to support the event, taking them away from more meaningful work for an entire day.

4.2 Methodology

During this study, Deloitte - in support of Department of Combat Medic Training (DCMT) - researched, designed and developed a technical solution to digitize and integrate forms-based testing and training documents into the 68W Training Program. This research focuses on the process flow used by instructor(s) to evaluate the performance of a sample group of students, not the service members themselves. It is not a human study. The population was determined from students and instructors who participated in 68W PEs. The specific area of interest was the digital conversion of paper to electronic forms, and two-way secure wireless synchronization of the Tablet PC, and central servers managing the data.

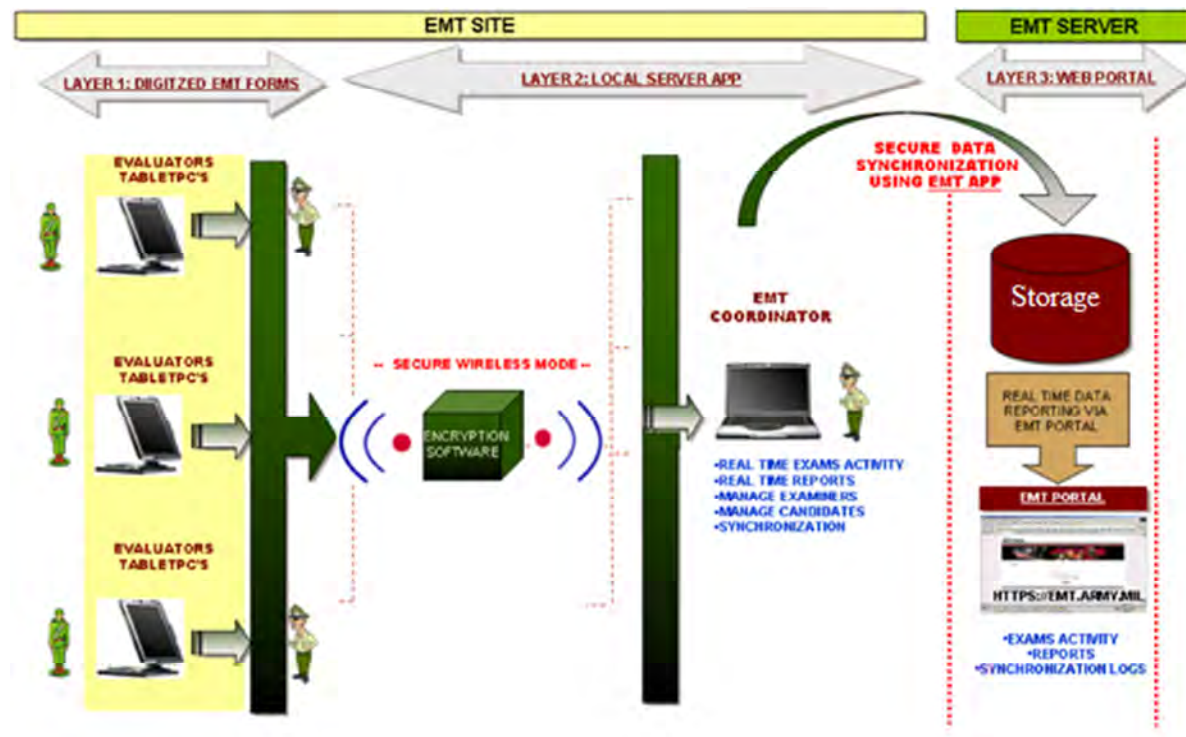
After defining requirements and designing and testing a prototype in phase I, a pilot was conducted to prove the concept, with the goal of producing an understanding of the department's business processes and functional requirements and to ensure the design would support the mission in an operational environment.

This final report and supporting document will serve to provide a record of the results for use in improving the efficiency and accuracy of the 6W program and potentially apply lessons learned to other programs as well. The projected benefits included specific gains in efficiency, accuracy, data security and enhanced administration capability.



4.3 Prototype Design

Based on needs identified by DCMT, a technical architecture was conceived, and requirements for the solution design were developed.



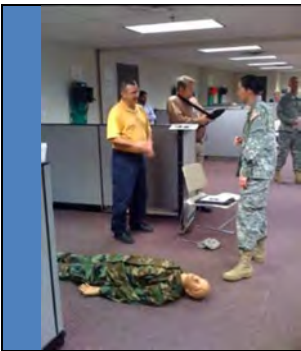
The diagram above shows the functional design of the technical architecture. The design selected includes:

- 1- Tablet PCs used for data entry and transmission using secure wireless transmission
- 2- The Tablet EMT Program (TEMTP) – a software program developed for this testing automation solution - resides on each of the 75 Tablet PCs programmed
- 3- EMT Coordinator – an application residing on a laptop station used by the course coordinator
- 4- EMT Server/Web Portal – web based portal providing access to data stored on the server

The instructors evaluating students taking the exam use Tablet PCs with TEMT (the automated testing program) and transfer the data using the Tablet PCs wireless transmission capability across a secure wireless closed network to the EMT Coordinator. A course coordinator reviews any test failures and monitors results and performance of both students and instructors using the EMT Coordinator processing center software, and the EMT Coordinator synchs the data with the EMT Web Portal for storage. Once stored in the EMT Web Portal, the data can be retrieved using an offline web portal access protocol, making the data secure and allowing re-creation of the form as originally entered during the exam. The data can also be processed for reports and analysis or for transmission to authorized requestors either through the internal web portal or by downloading encrypted files to any digital storage media device.

4.4 Projected Benefits

During the assessment of the current state, we identified several benefits to the current processes listed in the left column and the benefit categories listed in the top row of the table below.

	Efficiency	Accuracy	Simplification	Security
Administer Exam	✓	✓	✓	✓
Evaluate Exam	✓	✓	✓	
Management	✓		✓	
Reporting	✓	✓	✓	✓

Detailed benefits are described below.

4.4.1 Increased efficiency:

a. Reduced paper use and associated storage and management cost:

Storage and management of paper forms in filing systems is a major cost that is mitigated by use of electronic systems. In the pilot the form is never printed, is stored as a digital file in a central database which allows dynamic recreation of the instructor's entry.

b. Free up manpower used as runners and processors:

Use of the soldiers as runners during the testing is not required for transfer of data that is now in digital format from start to finish. This allows the soldiers to be utilized for other duties.

Processors that took the paper from the runners, scored exams and processed results to be returned by runner to instructors are also reduced or eliminated by the automation of the process.

c. Instant scoring/feedback including details for corrective assistance:

Scoring will be tabulated instantly upon submission by the instructor evaluating the student's performance. The results will display instantly for the instructor to pass on the initial pass/fail status to the student. In the event of a failure, the course training coordinator has the authority to over-ride the results, and will utilize the automated report including any notes captured during the evaluation in combination with other factors to make the final decision. The coordinator can utilize the "fail report" feature to generate a list of students who have failed a portion of the course in order to perform a review at any time – allowing more efficient processing compared to reviewing paper forms brought by runners to a collection point for manual processing. A coordinator can provide the student more comprehensive rationale for their failure at this point to help them prepare to re-test.

d. Decreased time required for overall testing process:

The original process of evaluating students included two days - totaling approximately 20 hours of time – to run the simulation and evaluate two shifts of students each day. The process

efficiencies gained from automating testing and eliminating some of the wait times was projected to be significant.

4.4.2 Increased accuracy:

a. Legible capture of instructor comments:

Paper forms included hand-written entry, which is eliminated with the tablet based solution. The instructor has an option to enter notes in free text with automatic conversion to digital text (conversion of handwriting to text) or use pre-scripted comments from a drop-down menu.

b. Validation of input prior to submission:

The tablet will not allow submission of an incomplete evaluation, and requires the instructor to validate the content prior to submission.

c. Import of student demographics:

The automated form's population of student demographic information for identification reduces the potential for error in filling out the form, preventing potential loss of results due to incomplete fields.

4.4.3 Administrative simplification:

a. Enable automated management of performance indicators:

Statistical analysis normally used to monitor the performance of both students and instructors is automated and can be accessed using pre-loaded report formats. This allows analysis of patterns including pass/fail rates, multiple failures at same site, relating the failures to specific factors has potential to improve the quality of the training program. Reports are produced with a click rather than having to transcribe and analyze paper documents into computable format.

b. Web-enabled access:

Ability to access various reports and features of the system using any computer with web access allows flexibility for application use.

c. Automated synchronization of EMT Coordinator and EMT Web Portal:

As digital data must be protected from loss either by hardware failure or theft, The EMT Coordinator will automatically transfer or synch all records to a central repository residing on a local secure web server – the EMT Web Portal. This will not only free up space on the device - allowing it to work more efficiently - but will provide a failsafe location to store all records for all exam locations. In the event of hardware failure where data would normally be loss, a coordinator or leadership can easily retrieve (i.e. view or print) that data from the server by logging into a web portal. The web service will encrypt and transfer the records from TEMTPC application to EMT Web Portal from the click of a button. Once all data has been successfully synchronized EMT will notify the coordinator of its successful completion. This action can be instantly verified by login into the EMT Web Portal and viewing a log of all synchronized records.

d. Digital data sharing capability:

When data requests are received, such as requests from the National Registry, there was extensive manual effort required to prepare and share paper-based forms. The solution designed would allow access to be granted through EMT Web Portal if approved, or data can be easily exported by selected criteria to a portable medium (i.e. CD or Tape). This feature can save shipping costs as well. The data stored will allow dynamic recreation of the exact format and content of the data entered on the screen of the tablet by the instructor.

4.4.4 Enhanced data security:

It is essential to maintain confidentiality of each candidate's records. All components will provide 128-bit encryption. As data will be transmitted from component to component it will be encrypted using a 128-bit algorithm to ensure privacy and prevent theft. Encryption applies to three states of the data – during the initialization process, when the data is entered by instructors and processed to include providing results, storage, and transfer from storage to a requestor.

a. Encryption during testing process during transfer between instructor to evaluator:

Data is encrypted as soon as it is submitted in the tool for transmission during evaluation.

b. Encrypted storage:

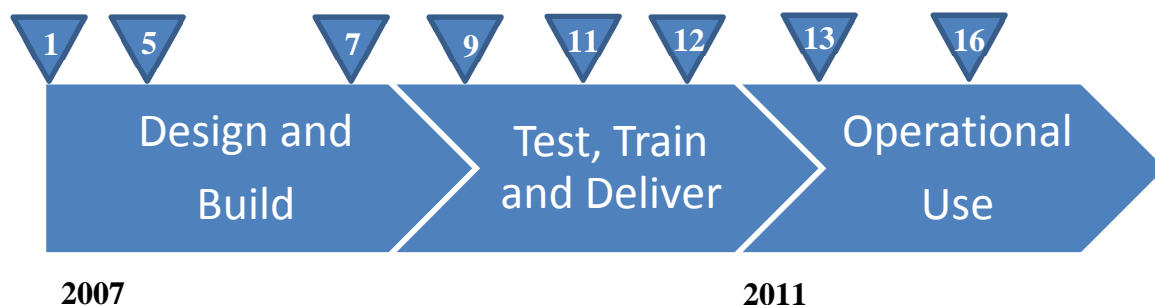
Once entered, the storage of data includes encryption to ensure that data cannot be used if stolen or shared without approval.

c. Encryption for transfer:

The data can be transferred via the web portal or copying to storage media – remaining encrypted for secure transfer.

5 Work Plan

The timeline below is divided into three phases: the first two were performed by Deloitte and the last one reflects the ongoing field use of the tools and methods that were provided. It shows major milestones, with expanded milestones/deliverables listed in the key below.



5.1 PHASE I

1. Project Start
2. Define Project Scope
3. Functional Requirements – What were the requirements needed?
4. System Requirement Specifications – How would the system meet these needs?
5. System Design
6. Prototype build and testing – Working in an office environment, test the devices.
7. Validation of system functionality
8. Phase I end

5.2 Phase II

8. Project Start
9. System Build – Build the applications and wireless/server environment
10. Certification and Accreditation

11. System Testing & Training
12. System Delivery
13. Technical Support Plan & Documentation
14. Final Report
15. Project End

Operational Use

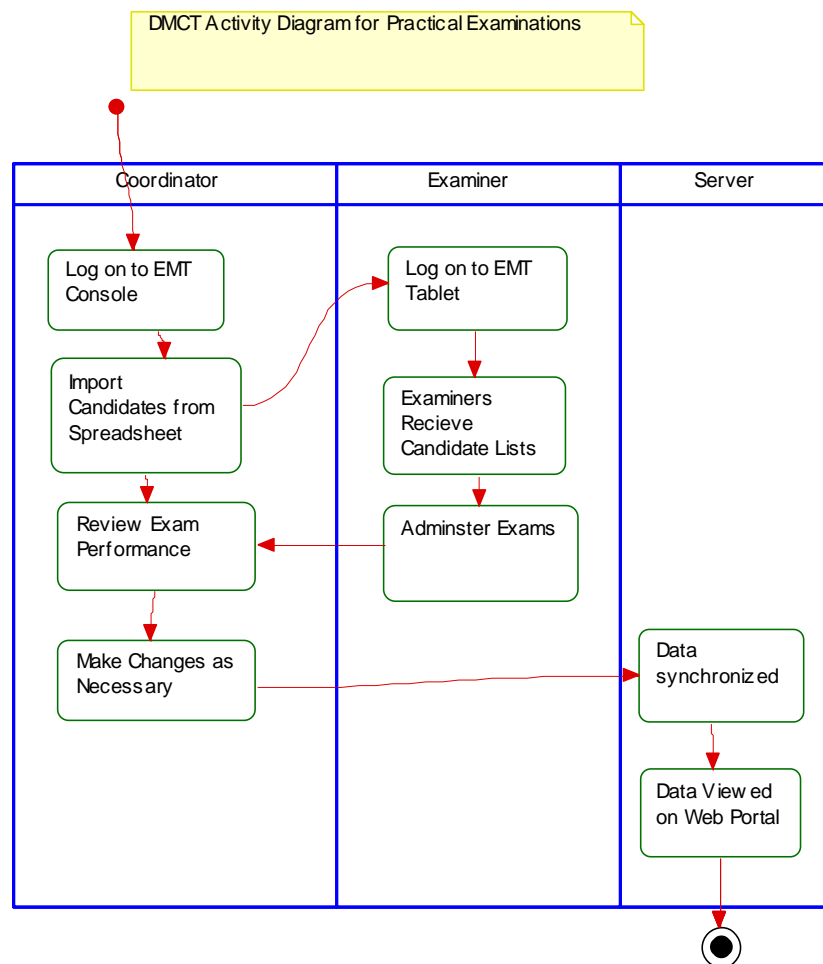
16. Implement Recommendations

6 Concepts of the Pilot System

The system transforms the current paper-based Practical Exam into an electronic format residing on a Tablet PC based secure wireless network. It digitizes the forms and the flow of the data from the Tablet PCs to the testing coordinator and finally to the DCMT central servers using a web portal application.

6.1 DCMT Activity Diagram

This system digitizes the testing forms, and helps to improve the efficiency of the instructional learning and examination process as depicted in the UML Activity Diagram below.



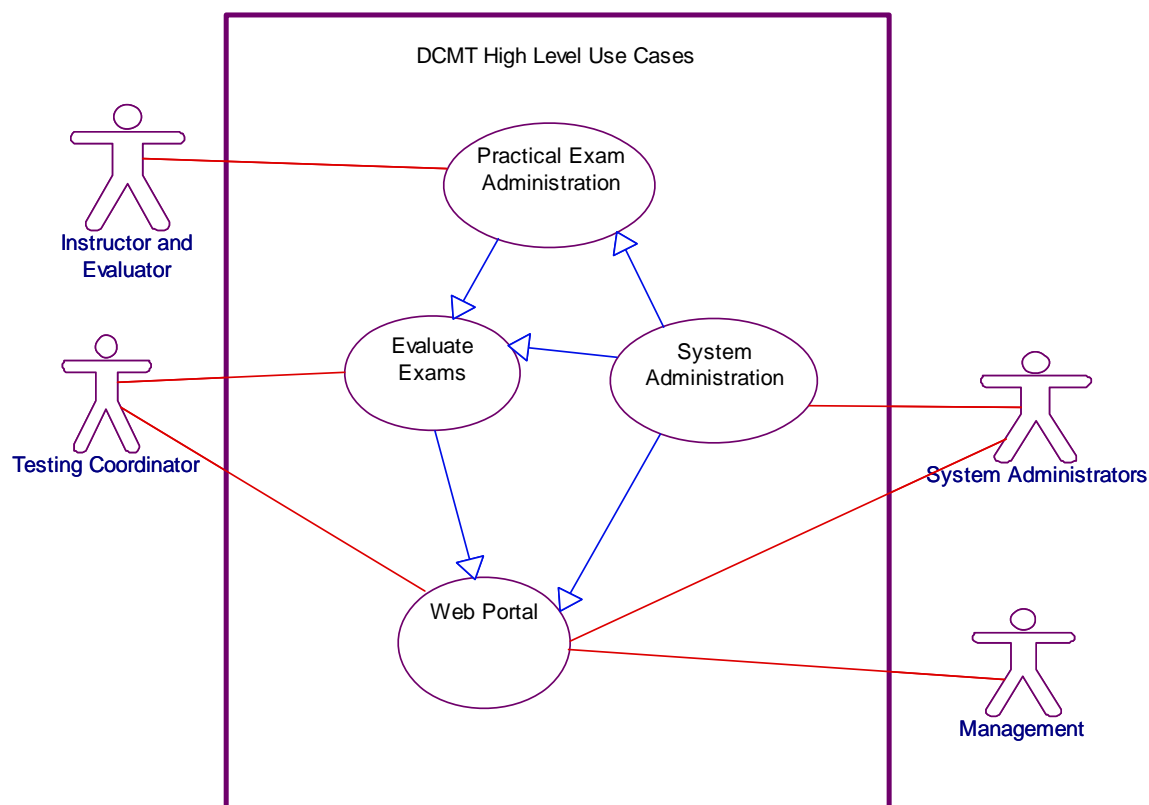
6.2 DCMT Use Cases

The system supports the following objectives using mobile wireless environment:

1. Collect metrics in real-time,
2. Analyze the collected metrics,
3. Provide feedback based on the analysis, and
4. Generate reports based on the feedback to aid further improvement of the training and testing process.

In this research, we documented the Use Cases using a standard object based UML modeling technology IBM Rhapsody 7.5. Information and models are contained in Appendix A and B.

The Use Case models identify the interaction between the System (DCMT) and the various Actors using that system. Each use case is then broken down into a series of system requirements.



These system requirements will then be housed around a three tiered set of Layers

6.3 DCMT Technology Layers

The system contains three layers of technology for collection, processing and reporting.

- Layer 1: Tablet PC Forms Application to collect and review data
- Layer 2: Local Laptop Server Application to process and analyze secure digital data
- Layer 3: EMT Web Portal and Central Database Server for real time reporting and verification

6.3.1 Layer 1: Tablet PC Forms Application

EMT Tablet PC Application – The EMT Tablet PC application is used by the instructors to digitally capture data entered into an electronic version of the EP exam. The application replicates an exact electronic copy of the 13 EP forms to provide the comfort and recognition to the instructor of the actual paper form. The application provides validation controls so that necessary information is collected and entered. The electronic form will automatically display the candidate information and examiner's name.

6.3.2 Layer 2: Local Laptop Server Application

This application will be used by the site Coordinators to manage instructors and candidates as well as facilitate data gathering, reporting and analysis. The data submitted by instructors at the site is stored on the local laptop server and managed by the application. The application scores the form and inserts data into a secure database. This database contains the forms' information, which is used for real-time exam activity and real-time reporting. The application allows the EMT coordinator to synchronize data stored in the local, central repository of the EMT central server, viewed via a secure web portal.

6.3.3 Layer 3: EMT Web Portal and Central Research Data Collection System

The EMT Coordinators and Leadership use the EMT Web Portal application to view and analyze the data submitted by EMT sites. Data submitted by the EMT sites is synchronized from the local EMT sites into the central EMT database server. This database server acts as the permanent repository to store EMT related data. The EMT Web Portal application accesses the EMT central database server to generate reports and acts as a data archiving tool as well. The EMT web portal restricts access to those individuals who are authorized to view data.

6.4 Detailed Use Cases Aligned with Requirements

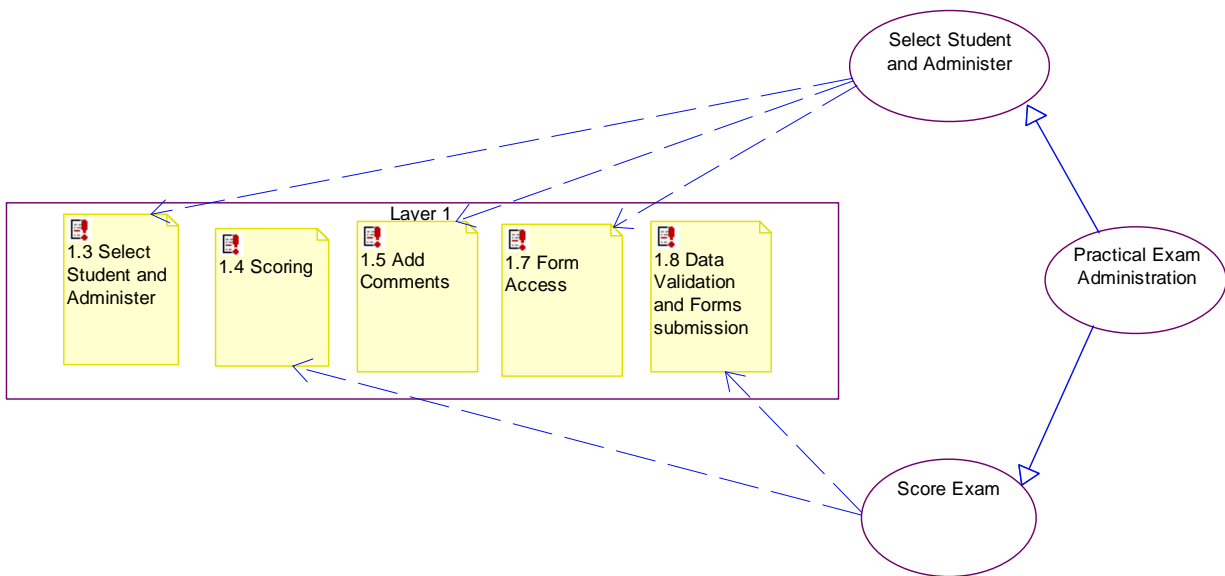
The requirements are presented in the format | Req X.X where X reflects the tag number assigned to each requirement..

6.4.1 Practical Exam Administration

This Use Case scope entails the actions performed by the instructor or evaluator to document the practical exam. It consists of the two use cases of

- Select Student and Administer the Exam
- Score the Exam

There are five high level requirements that support these two cases and are shown in the diagram below.



6.4.2 Req 1.3.SELECTION OF CANDIDATE AND EXAMINATION

- 1.3.1 - The system will fetch the list of scheduled candidates from the local database every day.
- 1.3.2 - The system will display a list of candidates scheduled for that day alone and nobody else.
- 1.3.3 - The evaluator will select a candidate from the list.
- 1.3.4 - The system will then display the list of 13 exams for the candidate, allowing access only to those forms that were not already graded by the evaluator earlier on the same day.
- 1.3.5 - The system will not allow access to any forms for candidates who have failed four exams or the same exam three times.

6.4.3 Req 1.4.SCORING OF EXAMS

- 1.4.1 - The system will allow the evaluator to check or uncheck responses to the questions based on the actions performed by the candidate.
- 1.4.2 - The system will allow the evaluator to check or uncheck certain critical criteria based on whether or not the candidate performed some important actions.

6.4.4 Req 1.5.COMMENTS

1.5.1 The system will allow the evaluator to note down remarks and comments about the candidate's performance and a list of the actions performed by the candidate

6.4.5 Req 1.7.FORM ACCESS

1.7.1 The system will not allow a candidate to test for any particular exam with a particular evaluator more than once.

1.7.2 The system will not allow a candidate who has failed the same test thrice or four tests on the whole to take any further tests on the same day.

6.4.6 Req 1.8.DATA VALIDATION AND FORM SUBMISSION

1.8.1 The system will not allow an incomplete form (i.e. One where all fields have not been filled) to be submitted.

1.8.2 The system will accept a signature of the evaluator and only then will it let the form to be submitted.

1.8.3 The system will authenticate the evaluator's signature with the last four digits of the evaluator's Social Security Number, and only then will the signature be accepted and the form allowed to be submitted.

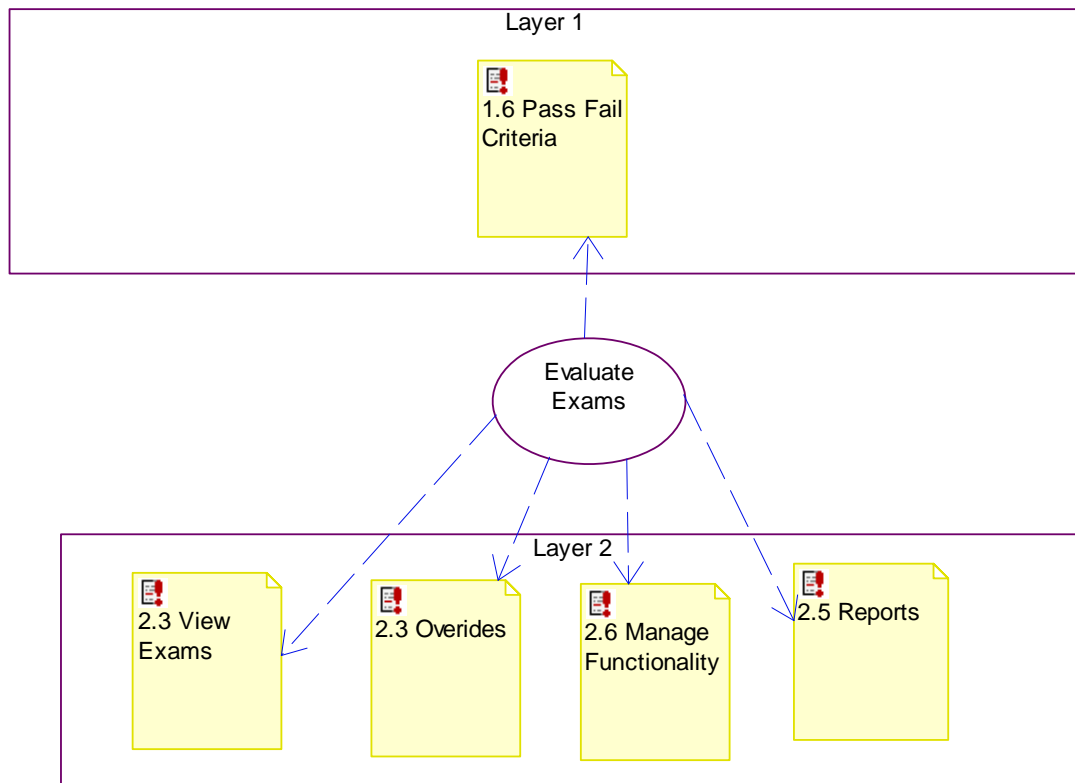
1.8.4 The system will allow evaluators to make changes even after the form has been signed, but the form has to be resigned before being submitted.

1.8.5 The system will insert all submitted records into the local server's database immediately via a wireless connection.

1.8.6 The system will not allow evaluators to make changes to, or view submitted forms.

6.5 Evaluate Exams

The diagram below shows the high level requirements that support the evaluation of the exam results.



6.5.1 Req 1.6 PASS/FAIL CRITERIA

1.6.1 - The system will consider a candidate who has a score greater than the minimum score required to pass the skill and no checked critical criteria, to have passed the skill.

1.6.2 - Any candidate, not meeting any of the above stated requirements, is considered to have failed the skill.

6.5.2 Req 2.3 VIEW EXAMS

2.3.1 - The application will allow the coordinator to view submitted exams (both passed and failed) for review.

2.3.2 - The application will allow the coordinator to view the exams based on groups and teams.

2.3.3 - The application will allow the coordinator to view graded individual skills.

6.5.3 Req 2.4 OVERRIDE

2.4.1 - The application will allow the coordinator to rescore submitted exams should there be a need.

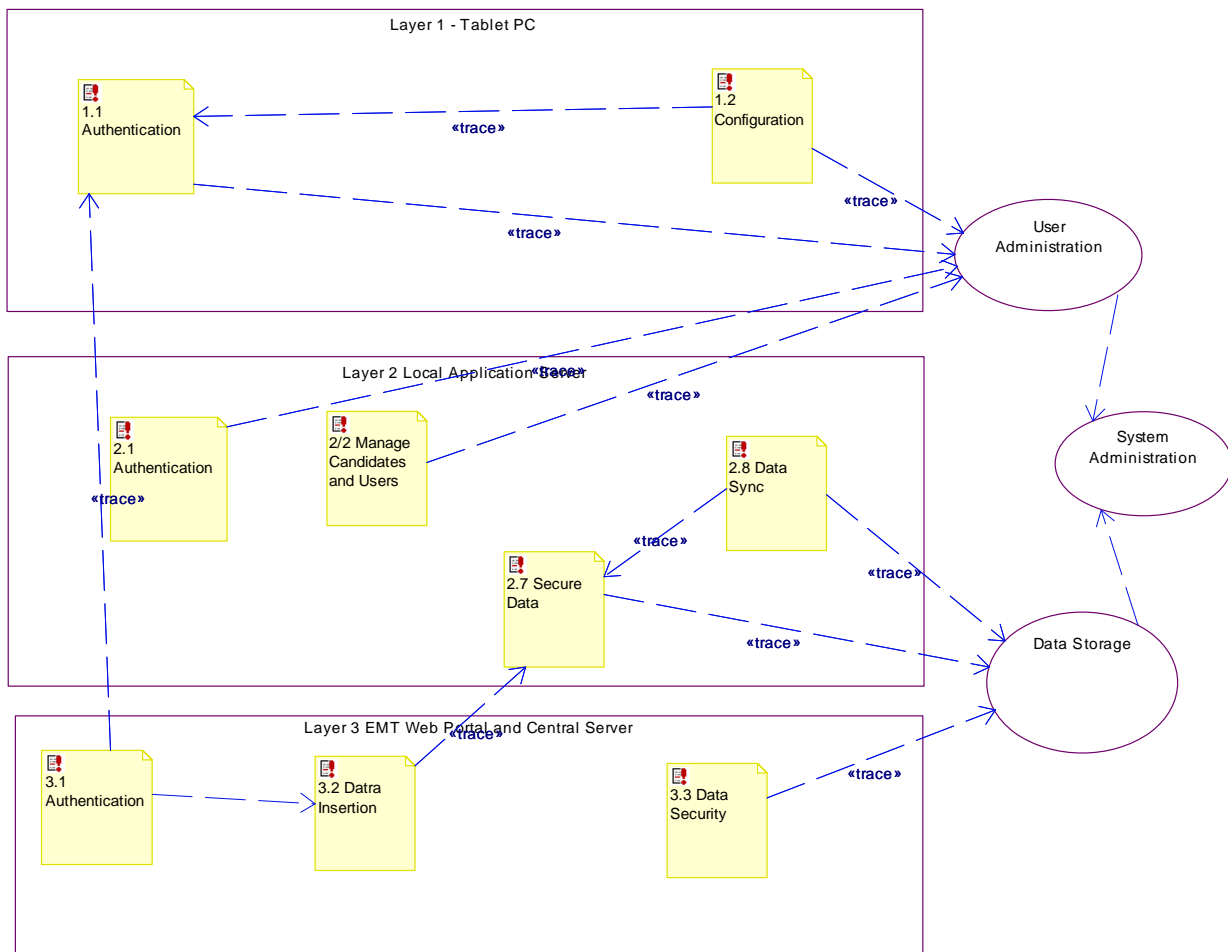
2.4.2 - The application will allow the coordinator to submit the rescored exams only if the candidate receives a passing grade after rescoring.

6.5.4 Req 2.6 MANAGE APPLICATION FUNCTIONALITY

2.6.1 - The application will allow the coordinator to delete submitted forms should there be a need.

2.6.2 The application will allow the coordinator to delete all or particular synchronized records.

6.6 Systems Administration Use Case



6.6.1 Req 1.1 AUTHENTICATION

1.1.1 - The users will be created on the local EMT Console server by the site coordinator.

1.1.2 The system will allow only authorized users (i.e. the evaluators), to log in.

1.1.3 The system will authenticate the users by verifying the username and password entered by the user against the ones set in the EMT local database server.

1.1.5 The system will lock the user account if the wrong username or password is entered thrice.

1.1.6 The system will require the users to reset their passwords, every 90 days.

6.6.2 Req 1.2 APPLICATION CONFIGURATION

1.2.1 The users will be required to configure the system, the first time they login.

1.2.2 They will need to provide the name or IP Address of the local laptop server which hosts the local database.

6.6.3 Req 2.1 AUTHENTICATION

2.1.1 The application will have an administrator username and password, which will be provided only to the site coordinator.

2.1.2 The system will lock the user account if the wrong username or password is entered thrice.

2.1.3 The system will require the users to reset their passwords, every 90 days.

6.6.4 Req 2.2 MANAGEMENT OF USERS AND CANDIDATES

2.2.1 The application will allow the coordinator to prepare the list of scheduled candidates for the day, either by adding them manually or by importing from an Excel spreadsheet.

2.2.3 The application will allow the coordinator to edit the profiles of existing candidates.

2.2.4 The application will allow the coordinator to add evaluators, create usernames and passwords for them, and edit and manage their profiles.

2.2.5 The application will allow the coordinator to add groups and teams and create and delete mappings between them.

2.2.6 The application will allow the coordinator to assign candidates to particular groups and teams.

6.6.5 Req 2.7 SECURE DATA

2.7.1 All data, instructors', candidates' and exams', will be stored in a secure MS SQL Server Database.

2.7.2 All wireless data flow between the tablets and the local server will use the DoD certified encryption software "AirFortress".

2.7.3 All data flowing between the local server and the central server will adhere to DoD network policy.

6.6.6 Req 2.8 DATA SYNCHRONIZATION

2.8.1 The application will allow the coordinator to synchronize the records with the central database using a web service.

2.8.2 The application will authenticate the user before synchronizing, by getting them to enter a username and password, which was created when they registered as a user on the web portal.

2.8.3 The application will run the web service over a Secure Socket Layer (SSL) on port 443(https).

6.6.7 Req 3.1 AUTHENTICATION

3.1.1 The web service will use the same username and password that was created by the user when he/she registered on the web portal.

3.1.2 This username and password will be required to be provided when synchronizing records from the local laptop server, which is the only way to access the web service.

6.6.8 Req 3.2 DATA INSERTION

3.2.1 The web service will insert the data it receives from the local laptop server during the synchronization process, into the central database.

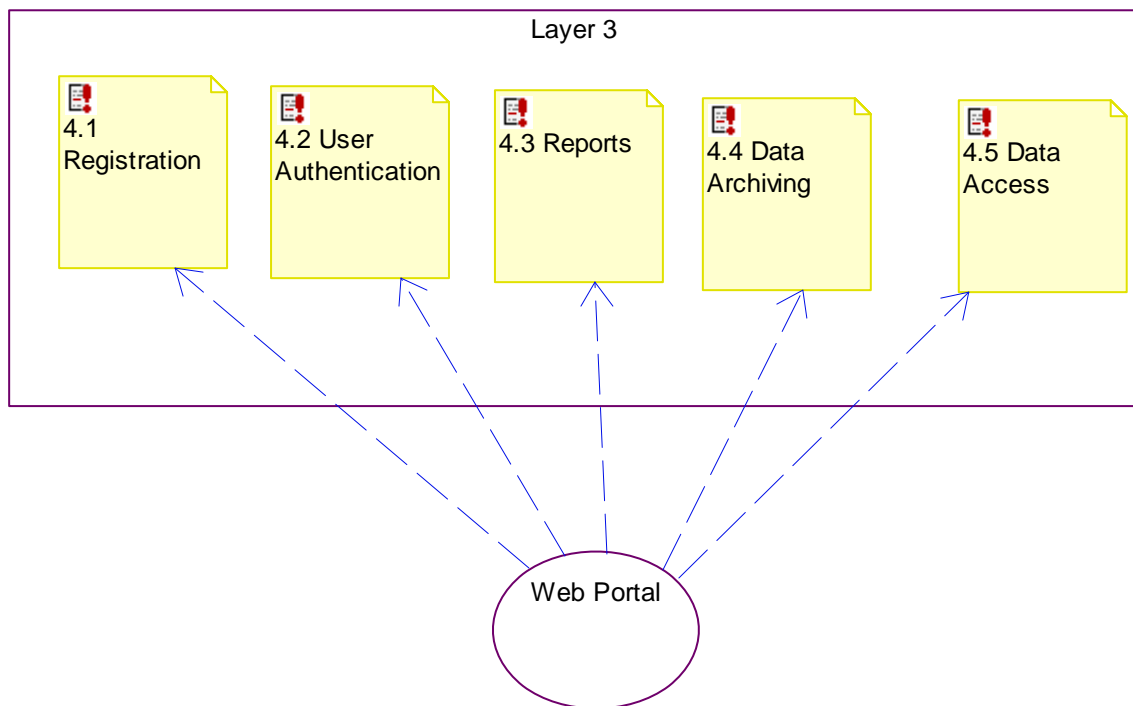
3.2.2 The data in the central database will be accessed via the web portal alone and by registered portal users alone.

6.6.9 Req 3.3 DATA SECURITY

3.3.1 The web service will be run over a Secure Socket Layer (SSL) on port 443 (https).

3.3.2 The data in the central database will be accessed via the web portal alone and by registered portal users alone.

6.7 Web Portal Use Case



6.7.1 Req 4.1. REGISTRATION

4.1.1 The portal will allow potential users to register for accounts by providing their Name, Social security Number and e-mail address.

4.1.2 The users will also specify the kind of user group they would like to register for like Coordinator, Administrator or Evaluator.

4.1.3 The administrator will then review the details provided and approve or disapprove the users.

4.1.4 The portal will send out an e-mail to the requestors, informing them about the status of their request.

4.1.5 The e-mail will also contain the username and password, which will be auto-generated by the portal, should the request be accepted.

4.1.6 The portal will ask the users to change their password on the first login and later periodically.

6.7.2 Req 4.2 USER AUTHENTICATION

4.2.1 The portal application will verify the username, password and account type, before letting the users log in to the application.

4.2.2 The portal will allow only three types of users: Administrators, Coordinators and Evaluators.

4.2.3 The portal will allow the administrator to manage users and their profiles, process requests for accounts and nothing more.

4.2.4 The portal will allow coordinators to view all records, synchronized from their site alone.

4.2.5 The portal will allow evaluators to view records submitted by them alone and nothing more.

4.2.6 The system will lock the user account if the wrong username or password is entered thrice.

4.2.7 The system will require the users to reset their password, every 90 days.

6.7.3 Req 4.3 REPORTS AND RECORDS

4.3.1 The portal will allow the coordinator to view individual exam-based reports.

4.3.2 The portal will allow the coordinator to view rescored exams-based reports.

4.3.3 The portal will allow the coordinator to view evaluator-based reports.

4.3.4 The portal will allow the coordinators to view individual exams submitted from their site and also exams that were rescored by them.

4.3.5 The portal will allow the evaluators to view exams and reports pertaining to exams submitted by them alone, and evaluator-based reports pertaining to them alone.

4.3.6 The portal will not allow the evaluators to view any rescored exam or rescored exams report.

6.7.4 Req 4.4 DATA ARCHIVING

4.4.1 The portal will serve as a central repository for all data collected using the Local Laptop Server application and the Tablet PC application.

4.4.2 The portal will allow for coordinators or leadership to retrieve any exam, transfer exam data to a portable media or print a replica of the exam.

6.7.5 Req 4.5 DATA ACCESS:

4.5.1 The portal will allow the coordinators to view individual exams submitted from their site and also exams that were rescored by them.

4.5.2 The portal will allow the evaluators to view exams and reports pertaining to exams submitted by them alone, and evaluator-based reports pertaining to them alone.

4.5.3 The portal will not allow the evaluators to view any rescored exam or rescored exams report.

6.8 Application and Data Security Requirements

6.8.1 Req 5.1 SECURE AUTHENTICATION

5.1.1 The portal will automatically generate the username and password for the users by using their first name, last name and social security number.

5.1.2 The portal will create a password based on the following rules:

5.1.2.1 Password will have a minimum length of 10 characters

5.1.2.2 Password will contain at least 2 each of upper-case alphabets, lower-case alphabets, numbers and special characters.

5.1.3 The portal will request the user to change the password on the first login and again periodically.

5.1.4 The access to Tablet PC and EMT Console will be managed by the DoD Network Policy.

5.1.5 The users for the Tablet PC and EMT Console applications will be created on the EMT Console server.

5.1.6 The same password rules will apply to users created for the local EMT Console server application and the Tablet PC application.

6.8.2 Req 5.2 DATABASE AUTHENTICATION

5.2.1 Any access to the database will be authenticated by a username and password which will be provided by the application once the user has been authenticated.

6.8.3 Req 5.3 DATA TRANSMISSION SECURITY

5.3.1 The data being transmitted by the wireless network will be protected by the DoD approved encryption software “AirFortress”, available at the site of deployment.

5.3.2 The data being transmitted by the wired network will be protected by the security mechanisms available on the DoD network.

7 Summary of the Pilot Build Out

The Pilot project was built around three components and their installed software:

- Tablet PC
- Laptop Console
- Central Server

7.1 Pilot Hardware



7.1.1 TABLET PC Specifications

- Brand: Fujitsu
- Model Number: Tablet PC
- Processor: INTEL CORE2 DUO Ultra Low Voltage U7600
- Screen: 12.1" XGA TFT with indoor/outdoor display with wide viewing angles
- Hard Drive: 40 GB S-ATA 150, 5400 rpm hard drive
- Memory: 1 GB DDR2 667 MHz memory (1 GB x 1)
- Main battery: Lithium ion (9-cell)
- Other: Integrated multinational 3 56K4 V.90 modem and Gigabit Ethernet LAN Integrated Intel® PRO/Wireless 3945ABG Network Connection (Tri-mode 802.11a/b/g) Integrated Fingerprint

Sensor, embedded TPM, dedicated Smart Card slot, Fujitsu Security Application Panel

7.1.2 Local Laptop Server Specifications

Local Laptop Server

- Brand: Any
- Model Number: Any
- Processor: Intel® Core™ 2 Duo processor (2.4GHz 800MHz 3MBL2)
- Operating System: Windows XP Professional
- Screen: 14.1 SXGA+ TFT
- Hard Drive: 200 GB Hard Disk Drive, 5400rpm with Disk Encryption
- Memory: 2 GB RAM
- Battery: 9 cell Li-Ion Battery
- Keyboard: Keyboard US English
- Optical device: DVD Recordable 8x Max Dual Layer, Ultrabay Slim
- Pointing Device: UltraNav (TrackPoint and TouchPad)
- Expansion slots: PC Card Slot & Smart Card Slot



- Wireless Card: 802.11a/b/g/n Wi-Fi wireless LAN card
- Power cord: Country Pack North America



7.1.3 Central Server Specifications

Central Server

- Brand: Any
- Model Number: Any
- Processor: Intel® Core™ 2 Duo processor T8300 (2.4GHz 800MHz 3MBL2)
- Operating System: Windows Server 2003
- Hard Drive: 200GB Hard Disk Drive
- Memory: 2 GB * 2
- Optical device: DVD Recordable 8x Max Dual Layer
- Pointing Device: UltraNav (TrackPoint and TouchPad)
- Expansion slots: N/A
- Power cord: Country Pack North America

7.2 Software Specifications

7.2.1 TABLET PC Software

- The application will require Microsoft .Net® Framework v 3.5.

7.2.2 Local Laptop Server Software

- The application will require Microsoft .Net® Framework v 3.5.
- The application will require Microsoft SQL Server® 2005 with reporting services tools.
- The application will require Microsoft Internet Information Services® (IIS®) v 6.0.
- The application will require Microsoft Web Services Enhancements® (WSE®) v 3.0.
- The application will require Microsoft Office® 2003 or 2007 (preferably 2007) to be installed on the local laptop server and the systems running the web portal to be able to export reports to an MS Excel® spreadsheet.

7.2.3 Central Server Software

- The application will require Microsoft Internet Explorer® (IE®) v 6.0 or later.

8 Pilot Operation and Test Results

Using the requirements from Section 7&8, Deloitte built a pilot DCMT system. Many additions to functionality were added during this phase with a compiled functionality list in the subsections that follow.

Pilot systems testing for compliance with the requirements were performed in the laboratory in April 2008. Work continued on the project until January 2010 where final field testing was conducted using actual subjects. We will describe the high level testing results in this section with complete testing results provided in Appendix C.

8.1 Preliminary Testing Results

System preliminary testing occurred over several days in late March 2008.

Second test March 2009

Final testing January 2010

8.1.1 Evaluator Tablet PC Functionality

The table below shows the eventual requirements created, the testing action and the expected system responses.

Requirements Description	Action	Expected Results
user enters his credentials to login into the tablet PC	user enters his/her correct User Id and password	The system authenticates the user based on his/her credentials against the EMT database and displays the pending Candidate list for the current set of exam days
user enters incorrect credentials	user enters incorrect User Id and password	The system prompts the user with message "Please enter correct user name and password"
List of pending candidates is displayed	Once the user credentials are verified and he/she is logged in, the system displays the list of pending candidates who are scheduled for the current set of exam dates.	System displays the scheduled candidates for the current set of exam dates. This list is sorted alphabetically based on the last name of the candidates.
user clicks on the Update Profile button to be able to change his/her name, SSN, Password and PIN	The user clicks on the Update Profile button	Another window opens up with the First and Last names and the Username and fields to update the password and PIN.
User changes name, password and/or PIN	The user changes his/her First and/or Last name and/or enters correct old password and new password and/or correct old PIN and new PIN, which have not been used in any of the last 10 password/PIN changes, twice(once as	System displays a message "Name/Password/PIN has been successfully updated"

	confirmation) and clicks on the Update Profile button	
User enters incorrect old Password/PIN	The user enters an incorrect old Password and/or PIN	System prompts the user with message "Incorrect old password/PIN entered"
User enters used new Password/PIN	The user enters a Password and/or PIN that has been used in any of the 10 previous password/PIN changes	System prompts the user with message "New password/PIN cannot have been used in any of the previous 10 attempts"
User enters incorrect format for new password	The user enters a password that contains less than 10 characters or does not contain at least two of: special characters, numbers, uppercase letters, lowercase letters	System prompts the user with message "Incorrect password format"
User enters the name or part of it in the Search by Name box and clicks on the Search button	User enters the soldier's name or part of it in the search by name text box and clicks on the Search By Name button	System filters the candidate list to show only those patients whose names either partly or completely match the search string
User enters the required SSN using the number pad and clicks the Search button	User selects the candidate's SSN using the number pad that pops-up when the user clicks on the Search by SSN field. He/She then clicks on the Search by SSN button.	System filters the candidate list to show only the patient whose SSN matches the entered string.
User selects the required candidate from the candidate list and clicks on LOAD FORM	User selects the required candidate's name from the Candidate list and clicks on the VIEW EXAM button	System displays a confirmation page with the candidate's name in big, bold letters and a YES and NO button.
User clicks YES on the confirmation page	User confirms that the name of the candidate and if it matches, clicks on the YES button	System loads the exams list for the candidate with the passed & failed exams marked appropriately
User clicks NO on the confirmation page	User confirms that the name of the candidate and if it does not match, clicks on the NO button	System loads the candidates list for the current set of exam dates again
List of all 13 exams is displayed	Once the user verifies the name of the candidate, a list of 13 exams is displayed	The list shows all 13 exams with updated statuses for each exam. The passed exams are grayed out and disabled with a tick mark before the exam name. The failed exams are displayed with a red cross mark before the name of the exam.
Selection of an exam	user select an exam for the candidate and presses the exam button/link	An exam is selected and the form for the exam is displayed
selection of a failed exam by the same examiner	user selects a failed exam for a candidate who was earlier failed in the same exam by the same examiner	System displays a message "Please ask the candidate to go to a different examiner for this exam"
selection of a failed exam by a different	user selects a failed exam for a candidate who was	System displays a message "Candidate has failed this exam <X> times". When the user

examiner	earlier failed in the same exam by a different examiner	clicks OK, it opens the exam form.
selection of an uncounseled failed exam by a different examiner	user selects a failed exam for a candidate who was earlier failed in the same exam by a different examiner and the candidate has not yet been counseled by the coordinator for the failed exam	System displays a message "Candidate has not yet been counseled for the exam. Please ask the candidate to go to the coordinator to complete counseling". The user clicks on OK and the System loads the list of candidates again.
exam form is loaded	The chosen exam form is loaded	System loads the corresponding exam form. The name of the exam is displayed on top of the form. The name of the candidate, the name of the evaluator and the exam date are displayed too. The timer is displayed with the start time button alone enabled. Also based on the attempt number, a label saying RETEST for the 2nd attempt and RETEACH for the 3rd and final attempt is also displayed on top. The total score is displayed at the bottom of the questions list. The instructions buttons, the scenario buttons (where applicable) and the comments buttons are also enabled. There should be a signature button at the bottom(on the 2nd page on two page exams)
The user chooses to view the instructions for examiner	The user clicks on the "Instructions for examiner" button	The system displays the instructions for the examiner in a full screen window with a close button on top. This window cannot be resized.
The user chooses to view the instructions for candidate	The user clicks on the "Instructions for candidate" button	The system displays the instructions for the candidate in a full screen window with a close button on top. This window cannot be resized.
the user chooses to view a scenario for the exam	The user chooses a scenario and clicks on the button with the corresponding number.	The scenario is loaded in a pop-up window. The window always stays on top and it is possible to move it around and resize it. The corresponding scenario button remains highlighted on either page. The scenario window is hidden whenever a message is popped-up for the user, until the user responds to the message.
The user chooses to cancel out of the form	The user chooses to cancel the form if he has selected the wrong form by pressing the cancel; button on the top.	The system prompts the user to confirm "Do you want to exit the exam?" When the user clicks "yes" the form is closed and the user is returned to the exams list for the candidate.
user is able to start the timer	The user choose to start the timer manually by pressing the "start time" button	The timer starts to track the time taken to complete the examination. The start time button is disabled. The pause time and stop time buttons are enabled.
user is able to start the timer on either page	The user choose to start the timer manually by pressing the "start time" button on either page	The timer starts to track the time taken to complete the examination. The start time button is disabled. The pause time and stop time buttons are enabled. This is reflected on the other page too.
user is able to pause	The user clicks on the	The timer stops. The PAUSE TIME button is

the timer	PAUSE TIME button and the timer stops ticking	hidden and the RESUME TIME is visible. The STOP TIME is still enabled.
user is able to pause the timer on either page	The user clicks on the PAUSE TIME button on either page and the timer stops ticking	The timer stops. The PAUSE TIME button is hidden and the RESUME TIME is visible. The STOP TIME is still enabled. This is reflected on the other page too.
user is able to resume the timer	The user clicks on the RESUME TIME button and the timer stops ticking	The timer starts again where it was paused. The RESUME TIME button is hidden and the PAUSETIME is visible. The STOP TIME is still enabled.
user is able to resume the timer on either page	The user clicks on the RESUME TIME button on either page and the timer stops ticking	The timer starts again where it was paused. The RESUME TIME button is hidden and the PAUSETIME is visible. The STOP TIME is still enabled. This is reflected on the other page too.
user is able to stop the timer manually	The user presses the "Stop Timer" button when exam is done.	The timer stops. All timer controls are disabled
user is able to stop the timer manually on either page	The user presses the "Stop Timer" button on either page when exam is done.	The timer stops. All timer controls are disabled. This is reflected on the other page too.
user grades the candidate for an exam	The user starts grading the candidate for the selected exam.	The user is able to select the radio buttons to mark the candidate's response to a question.
Automatic calculation of candidates score on an exam	As user keeps on marking the Y/N answers. The system automatically adds a 1 mark for each question answered as Y. The system subtracts 1 mark for each question answered as N.	The marks for the candidate are automatically calculated and displayed. Refer "Quantitative Statistics" tab to see the minimum passing score required to PASS the examination.
user selects the check box for a "Critical criteria"	user select the check box for a critical criteria question	The critical criteria check box gets checked
For the forms which span over multiple pages, a "Next" button is available on the first page	If exam got multiple pages, the evaluator clicks the "next" button to move to the next page of the form	The next page of the form is displayed for the user to grade the candidate on. The previously graded questions are correctly populated.
For the forms which span over multiple pages, a "Back" button is available on the 2nd page	If exam got multiple pages, the evaluator clicks the "back" button to move to the previous page of the form	The previous page of the form is displayed for the user to grade the candidate on. The previously graded questions are correctly populated.
user is allowed to enter/see his comments	user clicks on VIEW/ADD Comments and a pop up text box opens	The user is able to enter in his remarks by either appending to the existing comments or replacing the existing comments or by adding new comments. He/she can also view comments he/she entered previously for the same exam.
user is able to enter long comments	user enters really long comments and these are accepted	System allows users to enter comments up to 1000 characters
user tries to submit an incomplete form	user clicks on submit button to submit an incomplete form	The system prompts the user to complete the form before submitting it. The non-completed

		question shall displayed in RED
user tries to submit an form without signing	user clicks on submit button without signing the form	The system prompts the user for signing the form before submitting it.
User enters the wrong PIN while signing the form	The user signs the form and clicks submit.	The system prompts the user to enter the correct PIN
User enters the correct to sign the form	The user signs the form and clicks submit.	The following message is displayed, "Digitally Signed By: " followed by the name of the user followed by the time and date of signing, in the Signature Box.
user completes the grading of the exam by signing the form but needs to revise the grading	The user signs the form but decides to re-grade the form. So he clicks on any of the questions to re-grade	The system clears the Digital Signature and form is available for re-grading
user completes the grading of the exam by signing the form and tries to submit after digitally signing the form with his/her PIN	The user signs the form by entering his/her PIN and clicks submit.	The form is submitted and the following message is displayed - "Exam Details successfully submitted". Once the user clicks on the OK button, the form is closed and the user is returned to the candidate list. Any open scenario pop-ups are also closed. The user is returned to the candidate list.
user completes the grading of the exam by signing the form and tries to submit after digitally signing the form with his/her PIN	The user signs the form by entering his/her PIN and clicks submit.	If the wireless connection is lost, the same is displayed as a message and the form is not submitted or closed. Scenario windows are not closed.
User clicks on sign or submit	User clicks on the sign or submit form buttons.	System prompts the user with the message - "Timer will automatically be stopped now". Once the user clicks OK, the timer is stopped and all timer controls are disabled.
All candidates who have either passed or failed the entire ALL SKILLS EXAMINATION will be removed from the candidate list	Any candidate who has passed 5 mandatory and 1 random exams or failed the same exam thrice or failed 4 different exams is removed from the candidate list. The candidate list only contains Pending candidates	System displays correct data on the list.
User enters the wrong PIN while signing the form	The user signs the form and clicks submit.	The system prompts the user to enter the correct PIN
User enters the correct to sign the form	The user signs the form and clicks submit.	The following message is displayed, "Digitally Signed By: " followed by the name of the user followed by the time and date of signing, in the Signature Box.
user completes the grading of the exam by signing the form but needs to revise the grading	The user signs the form but decides to re-grade the form. So he clicks on any of the questions to re-grade	The system clears the Digital Signature and form is available for re-grading
user completes the	The user signs the form by	The form is submitted and the following

grading of the exam by signing the form and tries to submit after digitally signing the form with his/her PIN	entering his/her PIN and clicks submit.	message is displayed - "Exam Details successfully submitted". Once the user clicks on the OK button, the form is closed and the user is returned to the candidate list. Any open scenario pop-ups are also closed. The user is returned to the candidate list.
user completes the grading of the exam by signing the form and tries to submit after digitally signing the form with his/her PIN	The user signs the form by entering his/her PIN and clicks submit.	If the wireless connection is lost, the same is displayed as a message and the form is not submitted or closed. Scenario windows are not closed.
User clicks on sign or submit	User clicks on the sign or submit form buttons.	System prompts the user with the message - "Timer will automatically be stopped now". Once the user clicks OK, the timer is stopped and all timer controls are disabled.
All candidates who have either passed or failed the entire ALL SKILLS EXAMINATION will be removed from the candidate list	Any candidate who has passed 5 mandatory and 1 random exams or failed the same exam thrice or failed 4 different exams is removed from the candidate list. The candidate list only contains Pending candidates	System displays correct data on the list.

8.1.2 Examiner Portal Functionality

The table below shows the eventual requirements created, the testing action and the expected system responses.

Requirements Description	Action	Expected Results
Examiner Login	Enter the User Id and password and hit submit tab	Gives Examiner access to the portal and brings to the "Home" screen of the portal
View Records by Date Range	In From and To tabs select the dates as desired to view the records and hit "Submit"	Lists all the exams reviewed in the specified time line
Export the records to Excel	Select the "Export to Excel" link in the top right corner	Open the records in an excel file
View and Print exam given by the student	Select the exam intended to view and click on "Print Exam" icon. When the exam opens select File>Print	Prints the selected exam
View Records by Month and Year	In Month tab select the month desired for viewing. In Year tab select the year	Lists all the exams reviewed in the specified month and year
Export the records to Excel	Select the "Export to Excel" link in the top right corner	Open the records in an excel file
View and Print exam given by the student	Select the exam intended to view and click on "Print Exam" icon. When the exam opens select File>Print	Prints the selected exam
View Records by Date	Select the specific date in the "Date" tab as required	Lists all the exams reviewed by the examiner on that specific date

Export the records to Excel	Select the "Export to Excel" link in the top right corner	Open the records in an excel file
View and Print exam given by the student	Select the exam intended to view and click on "Print Exam" icon. When the exam opens select File>Print	Prints the selected exam
Search Record by SSN	Enter the SSN # searching for in the "SSN" tab and Last Name of the student in the "Last Name" tab	Lists the records
Export the records to Excel	Select the "Export to Excel" link in the top right corner	Open the records in an excel file
View and Print exam given by the student	Select the exam intended to view and click on "Print Exam" icon. When the exam opens select File>Print	Prints the selected exam
Sort Records by exams passed	The green "Passed" radio button is selected	Lists all the exams that were passed by the students administered by the instructor
Sort Records by exams failed	The red "Failed" radio button is selected	Lists all the exams that were failed by the students administered by the instructor
Sort Records by Exam Name	In the drop down menu select the exam name for which want to see the desired results	Lists all the exams given by the instructor with the selected exam name
Export records into Excel	Select the "Export to Excel" link in the top right corner and select "Open"	Open the records in an excel
Exam Centers Report based on date range	Select Reports from left menu and then select Exam Centers Report on the right. In From and To tabs select the dates as desired to view the reports for. Then hit Submit and select the exam for which need to view the results	Displays the 3D graph with the exam center report value
Export the Report to Excel	Select Export to Excel link on top right	Opens the report in Excel file
Export the Report to PDF	Select Export to PDF link on top right	Opens the report in .pdf file
The coordinator adds a new examiner	The coordinator selects Manage Examiner icon and selects Add Examiner link and fills in the credentials Username, Password, First Name, Middle Name, and Last Name	New examiner is added to the portal
The coordinator deletes examiner	The coordinator selects the examiner he wishes to delete and clicks on the red Delete User Account icon	The examiner account is deleted from the portal
The coordinator adds a commander	The coordinator selects Manage Commander and selects Add Commander and fills in the credentials Username, Password, First Name, Middle Name, and Last Name	New commander is added to the portal
The coordinator deletes commander user account	The coordinator selects the commander from the displayed list he needs to delete and clicks on the red Delete User Account icon. The system prompts for logging password. Enter admin password	The commander account is deleted
The coordinator adds a site coordinator	The coordinator selects Manage Site Coordinators and selects Add Site Coordinator and fills in Username, Password, First Name, Middle Name, and	New site coordinator is added

	Last Name	
The coordinator deletes the site coordinator user account	The coordinator selects the site coordinator from the displayed list he needs to delete and clicks on the red Delete User Account icon	The site coordinator user profile is deleted from the portal
The coordinator adds a admin to the portal	The coordinator selects Manage Administrators and selects Add Admin and fills in Username, Password, First Name, Middle Name, and Last Name	New administrator is added to the portal
The coordinator deletes the administrator deletes user account from the portal	The coordinator selects the administrator from the displayed list he needs to delete and clicks on the red Delete User Account icon	The administrator user profile is deleted from the portal
Change Account Password	Select Updater Account from the left menu. Type the new password in Password tab and retype the password in Confirm Password tab	Changes the user password associated with the account
Logging out of the Portal	Select Logout from the left menu	Logs out of the portal

8.1.3 Server Console Functionality

The table below shows the eventual requirements created, the testing action and the expected system responses.

Requirements Description	Action	Expected Results
The site administrator logs into the console with invalid credentials	The administrator enter incorrect User Id and password	The system prompts the user with message "Account inactive. Please contact administrator"
The site administrator logs into the console with correct credentials	The administrator enter correct User Id and password	The administrator is logged in
Administrator logs out	The administrator selects "Manage users->logout"	The administrator is logged out
Administrator exits the application	The administrator selects "Manage users->exit"	The system logs the administrator out and exits the application.
The administrator imports the scheduled users for the day	The administrator imports the user by selecting the "Manage users->manager candidates->import candidates" option and selecting the import excel file	The users are successfully imported into the system and displayed in the view candidate section
The administrator adds a new candidate to schedule for the day	The administrator clicks on add user and enters the details(SSN, First Name, Middle name, Last name, group name, team name, selects the schedule date" and clicks add	The new candidate is added to the system for the current day.
The administrator chooses to modify the profile of an existing candidate	The administrator selects a user from the view candidate screen and clicks edit. He then updates the necessary fields and clicks update	The user details are modified and persisted in the system
The administrator adds an	The administrator selects the option for add examiner. He fills in the necessary	The evaluator is added to the system and the list of evaluators is

evaluator/examiner	details(SSN, First Name, Middle name, Last name, user name, password) and clicks add	displayed on the manage evaluators screen
The administrator while adding the evaluator enters a user name which already exists	The administrator adds an evaluator but enters a user name which already exists in the system	The system prompts the user with message "username already exists, please choose another user name"
The administrator edits an evaluators profile	The administrator selects an evaluator under View Examiner option and clicks edit. He changes the necessary details and clicks update	The details of the evaluator are modified
The administrator deletes an evaluators profile	The administrator selects an evaluator under View Examiner and clicks delete	The evaluator is deleted from the system
The administrator adds a coordinator	The administrator selects the option for add coordinator. He fills in the necessary details(SSN, First Name, Middle name, Last name, user name, password) and clicks add	The coordinator is added to the system and the list of evaluators is displayed on the view coordinator screen
The administrator while adding the coordinator enters a user name which already exists	The administrator adds a coordinator but enters a user name which already exists in the system	The system prompts the user with message "username already exists, please choose another user name"
The administrator edits a coordinator's profile	The administrator selects a coordinator and clicks edit. He changes the necessary details and clicks update	The details of the coordinator are modified
The administrator deletes a coordinator profile	The administrator selects a coordinator and clicks delete	The coordinator is deleted from the system
The administrator refreshes the manage coordinator screen	The administrator on the manage coordinator screen clicks the refresh button	The manage coordinator screen is refreshed from the database with latest information
The coordinator chooses to synchronize exams but provides incorrect credentials or credentials which don't exist on the portal	The coordinator selects synchronize exams and can choose to synchronize either each exam individually or all at the same time by selecting Sync All but provides incorrect credentials or credentials which don't exist on the portal	The system responds with error message communicating to the user that the account doesn't exist and the credentials are invalid
The coordinator chooses to synchronize exams and provides correct credentials	The coordinator selects synchronize exams and can choose to synchronize either each exam individually or all at the same time by selecting Sync All and provides correct credentials	The exams are synchronized with the EMT server
The coordinator chooses to view all previously synchronized exams	The coordinator in Synchronize Exams tab selects Synchronized Exams	The system displays list of all previously synchronized exams along with users name, score, and P/F info
The coordinator chooses to delete 1 synchronized exam	The coordinator selects 1 exam from the list of synchronized exams and clicks Delete button	The selected synchronized exam gets deleted
The coordinator	The coordinator clicks Delete Sync	The system prompts the user to

chooses to delete all synchronized exam	button	confirm that he wants to delete all synchronized exams. Once you user confirms by clicking yes, all the synchronized exam get deleted
Maximum Synchronization Time	The synchronization should complete in Maximum 60 minutes	The synchronization completes in Maximum 60 minutes
The administrator chooses to view the passed candidates and searches by last name	The administrator clicks on "exams and candidates->passed candidates". He enters last name of a candidate and clicks the find button	The system displays the details of the candidate
The administrator chooses to view the passed candidates and searches by a particular date	The administrator clicks on "exams and candidates->passed candidates". He enters/selects a date and clicks the find button	The system displays the list of the candidates
The administrator chooses to view the passed candidates and searches by a range of date	The administrator clicks on "exams and candidates->passed candidates". He selects a range date by providing the values in "From" and "To" and clicks the find button	The system displays the list of the candidates
The administrator chooses to view the list of passed exams of a candidate	The administrator selects a candidate and clicks "View Exam"	The system displays the list of passed exams for a candidate
The administrator chooses to view the failed candidates and searches by last name	The administrator clicks on "exams and candidates->failed candidates". He enters last name of a candidate and clicks the find button	The system displays the details of the candidate
The administrator chooses to view the failed candidates and searches by a particular date	The administrator clicks on "exams and candidates->failed candidates". He enters/selects a date and clicks the find button	The system displays the list of the candidates
The administrator chooses to view the failed candidates and searches by a range of date	The administrator clicks on "exams and candidates->failed candidates". He selects a range date by providing the values in "From" and "To" and clicks the find button	The system displays the list of the candidates
The administrator chooses to view the list of failed exams of a candidate	The administrator selects a candidate and clicks "View Exam"	The system displays the list of failed exams for a candidate
The administrator chooses to view the pending candidates and searches by last name	The administrator clicks on "exams and candidates->pending candidates". He enters last name of a candidate and clicks the find button	The system displays the details of the candidate
The administrator chooses to view the pending candidates and searches by a particular date	The administrator clicks on "exams and candidates->pending candidates". He enters/selects a date and clicks the find button	The system displays the list of the candidates
The administrator	The administrator clicks on "exams and	The system displays the list of the

chooses to view the pending candidates and searches by a range of date	candidates->pending candidates". He selects a range date by providing the values in "From" and "To" and clicks the find button	candidates
The administrator chooses to view the list of pending exams of a candidate	The administrator selects a candidate and clicks "View Exam"	The system displays the list of pending exams for a candidate
The administrator chooses to view the current EMT information	The administrator chooses "Help->About EMT"	The systems displays the details about the current EMT application like "version etc"
The coordinator chooses to delete previous synchronization	The coordinator selects the exam from the list of listed previously synchronized exams that he wishes to delete and selects Delete Synchronization	The system deletes the selected exam from the displayed list of synchronized exams
The coordinator chooses to delete exam	The coordinator selects the exam that he wishes to delete and selects Delete Exam	The system deletes the selected exam from the list of exams.
The coordinator views report of all passed exams	Selects View Exam Reports>All Exams>Passed and fills in the search criteria i.e. date needed to view the reports of the passed exams	Lists all the exams passed in the specified timeline
The coordinator filters the passed exam records by examination name	Selects the exam to sort by from the options listed in Filter Record by Examination Exam	Lists the selected exam that were passed in the predefined timeline
The coordinator chooses to view the reports of passed exam by Group Name	Selects the group name the coordinator intends to view reports for from the listed group names in Group Name drop down.	Lists all the passed exams by candidates pertaining to the group selected in the search criteria
The coordinator chooses to view the reports of passed exam by Team Name	Selects the team name the coordinator intends to view reports for from the listed team names in Team Name drop down.	Lists all the passed exams by candidates pertaining to the team selected in the search criteria
The coordinator exports the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator chooses to rescore an exam	Selects the exam intended to rescore and selects view exam icon. Changes the points awarded as required. Enters the reason to rescore in the box and selects rescore box	The system rescors the exam
The coordinator views the reports of all failed exams	Selects View Exam Reports>All Exams>Failed and fills in the search criteria i.e. date needed to view the reports of the failed exams	Lists all the exams failed in the specified timeline
The coordinator filters the passed exam records by examination name	Selects the exam to sort by from the options listed in Filter Record by Examination Name	Lists the selected exam that were passed in the predefined timeline
The coordinator chooses to view the reports of failed exams by Group	Selects the group name the coordinator intends to view reports for from the listed group names in Group Name drop down.	Lists all the failed exams by candidates pertaining to the group selected in the search criteria

Name		
The coordinator chooses to view the reports of failed exam by Team Name	Selects the team name the coordinator intends to view reports for from the listed team names in Team Name drop down.	Lists all the failed exams by candidates pertaining to the team selected in the search criteria
The coordinator exports the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator wishes to view the exam taken by candidates	Selects the exam wished to view and selects view exam icon	The system displays the exam selected for viewing
The coordinator chooses to rescore an exam	Selects the exam intended to rescore and selects view exam icon. Changes the points awarded as required. Enters the reason to rescore in the box and selects rescore box	The system rescoring the exam
The coordinator chooses to view the reports of all exams	Selects View Exam Reports>All Exams>All and fills in the search criteria i.e. date needed to view the reports of all the exams	The system displays all the exams-passed and failed taken in the selected timeline
The coordinator filters the exam records by examination name	Selects the exam to sort by from the options listed in Filter Record by Examination Exam	Lists the selected exam that were passed in the predefined timeline
The coordinator chooses to view the reports of all exam by Group Name	Selects the group name the coordinator intends to view reports for from the listed group names in Group Name drop down.	Lists all the exams by candidates pertaining to the group selected in the search criteria
The coordinator chooses to view the reports of all exams by Team Name	Selects the team name the coordinator intends to view reports for from the listed team names in Team Name drop down.	Lists all exams by candidates pertaining to the team selected in the search criteria
The coordinator exports the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator wishes to view the exam taken by candidates	Selects the exam wished to view and selects view exam icon	The system displays the exam selected for viewing
The coordinator chooses to view the exam statistics	Specifies the dates between which the coordinator intends to view statistics for and selects pass or fail as desired	Lists the statistics of all the exams taken during the time frame
The coordinator views the statistic based on Group Name	The coordinator selects the group name to view the statistics of from Group Name drop down	Lists the selected group's performance statistics
The coordinator views the statistic based on Team Name	The coordinator selects the team name to view the statistics of from Team Name drop down	Lists the selected team's performance statistics
The coordinator chooses to export the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator views the exam statistics for all the exams taken on a particular date	In By Date tab selects the date for which he wishes to the results for in Date	Lists all the exams taken on the selected exams

The coordinator views the statistic based on Group Name	The coordinator selects the group name to view the statistics of from Group Name drop down	Lists the selected group's performance statistics on the specific date
The coordinator views the statistic based on Team Name	The coordinator selects the team name to view the statistics of from Team Name drop down	Lists the selected team's performance statistics on the specific date
The coordinator chooses to export the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator views All Exams taken till date	Selects All Exams link under Exam-wide Statistics	Lists all the exams taken till date
The coordinator views the statistic based on Group Name	The coordinator selects the group name to view the statistics of from Group Name drop down	Lists the selected group's performance statistics till date
The coordinator views the statistic based on Team Name	The coordinator selects the team name to view the statistics of from Team Name drop down	Lists the selected team's performance statistics till date
Coordinator exports the statistics to excel	Selects the intended statistics and selects Export to Excel	The system opens MS Excel spreadsheet with the exported data
Coordinator views the rescored exams between two specified dates	Defines the dates from and to for which intended to view the result for under Between Dates	The system displays all the exams rescored in the specified timeline
Coordinator chooses to view the rescored exams based on Examination name	Selects the exam to sort by from the options listed in Filter Record by Examination Name	Lists all the rescored exams with the specified Exam name between the predefined dates
Coordinator chooses to view the rescored exams based on Group Name	Selects the group name the coordinator intends to view reports for from the listed group names in Group Name drop down.	Lists all the rescored exams with the specified Group name between the predefined dates
Coordinator chooses to view the rescored exams based on Team Name	Selects the team name the coordinator intends to view reports for from the listed group names in Team Name drop down.	Lists all the rescored exams with the specified team name between the predefined dates
The coordinator exports the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator wishes to view the exam taken by candidates	Selects the exam wished to view and selects view exam icon	The system displays the exam selected for viewing
Coordinator views the rescored exams on a specific date	Selects the date for which intended to view the result under By Date	The system displays all the exams rescored on the specific date
Coordinator chooses to view the rescored exams based on Examination name	Selects the exam to sort by from the options listed in Filter Record by Examination Name	Lists all the rescored exams with the specified Exam name on the specific date
Coordinator chooses to view the rescored exams based on Group Name	Selects the group name the coordinator intends to view reports for from the listed group names in Group Name drop down.	Lists all the rescored exams with the specified Group name on the specific date
Coordinator chooses	Selects the team name the coordinator	Lists all the rescored exams with

to view the rescored exams based on Team Name	intends to view reports for from the listed group names in Team Name drop down.	the specified team name on the specific date
The coordinator exports the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator wishes to view the exam taken by candidates	Selects the exam wished to view and selects view exam icon	The system displays the exam selected for viewing
Coordinator views all rescored exams till date	Selects All Rescored under Rescored exams	The system displays all the exams rescored all the exams till date
Coordinator chooses to view the rescored exams based on Examination name	Selects the exam to sort by from the options listed in Filter Record by Examination Name	Lists all the rescored exams with the specified Exam name till date
Coordinator chooses to view the rescored exams based on Group Name	Selects the group name the coordinator intends to view reports for from the listed group names in Group Name drop down.	Lists all the rescored exams with the specified Group name till date
Coordinator chooses to view the rescored exams based on Team Name	Selects the team name the coordinator intends to view reports for from the listed group names in Team Name drop down.	Lists all the rescored exams with the specified team name till date
The coordinator exports the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
The coordinator wishes to view the exam taken by candidates	Selects the exam wished to view and selects view exam icon	The system displays the exam selected for viewing
Coordinator chooses to view the rescore statistics between two dates	Specifies dates in From and To under Between dates menu in the Rescore Statistics	The system displays the statistics of rescored exams during the specified timeline
The coordinator views the rescore statistic based on Group Name	The coordinator selects the group name to view the statistics of from Group Name drop down	Lists the selected group's rescore statistics between the two predefined dates
The coordinator views the statistic based on Team Name	The coordinator selects the team name to view the statistics of from Team Name drop down	Lists the selected team's rescore statistics b/w the two predefined dates
The coordinator chooses to export the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
Coordinator chooses to view the rescore statistics for a specific date	Chooses the date for which wished to view the statistics of rescored exams under the By Date	Lists the statistics of rescored exams on the specified date
The coordinator views the statistic based on Group Name	The coordinator selects the group name to view the statistics of from Group Name drop down	Lists the selected group's rescore statistics on the specific date
The coordinator views the statistic based on	The coordinator selects the team name to view the statistics of from Team Name	Lists the selected team's rescore statistics on the specific date

Team Name	drop down	
The coordinator chooses to export the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data
Coordinator views rescore statistics of all exams rescored till date	Selects All Exams link under Rescore Statistics	Lists the statistics of all rescored exams till date
The coordinator views the statistic based on Group Name	The coordinator selects the group name to view the statistics of from Group Name drop down	Lists the selected group's rescore statistics till date
The coordinator views the statistic based on Team Name	The coordinator selects the team name to view the statistics of from Team Name drop down	Lists the selected team's rescore statistics till date
Coordinator exports the statistics to excel	Selects the intended statistics and selects Export to Excel	The system opens MS Excel spreadsheet with the exported data
The coordinator chooses to view evaluator reports as a daily report	Defines the date for which the coordinator intends to view the report for in Date under Daily Reports	Lists the evaluator reports for the defined date
The coordinator chooses to view the daily report sorted by Evaluator's name	The coordinator selects evaluator's name to view the statistics for	Lists the selected evaluator's daily reports
The coordinator chooses to export the report to excel	Selects the export to excel icon	The system opens MS Excel spreadsheet with the exported data

8.1.4 Preliminary Test Results

The Deloitte Team conducted system tests beginning with the April 1, results below

Section	Number of Test Areas	Passed	Failed	Not Tested
Evaluator/Table PC	28	28	0	0
Portal	74	45	19	10
EMT Console	121	104	8	9
Total Test Cases	223	177	27	19

Continual testing and development conducted until the functionality listed above were complete.

8.2 December 2009 Field Testing

Deloitte conducted a train the trainer session and performed field system testing during a four day period. The following personnel were in attendance.

DCMT Personnel:

- Mr. Marcus Vigil
- Ms. Chavez
- CPT Brookins
- DCMT Instructors

Deloitte Personnel:

- Mr. Pawan Singh
- Mr. Raman Singh
- Mr. Devchand Chute
- Mr. Shivaraman Raghuraman



8.2.1 Day 1 Environment and Setups

Setup 64 Tablet PCs for use in the ALL SKILLS examination.

We set up the Tablet PC application on 64 Tablet PCs. We added the mapping between the server name and its static IP address into all the Tablet PC's. Each Tablet was completely charged. We also installed and configured the **EMT Console application** on the local server laptop along with the Application and Database on the laptop. The laptop was configured with a static IP address.

Setup Wireless Environment

The secure wireless environment was set up at the exam rooms in the following manner. We setup the Laptop Server with the Console application in the coordinators room. (Conf Room 120). A wireless controller acting as the main wireless gateway was also setup in the same room. The laptop server was connected to the gateway using an Ethernet cable. In each of the exam rooms, one wireless access points was setup to enhance the wireless connectivity for all the Tablet PCs.

8.2.2 Day 2 Training

The scope of training provided included:

- Train users on the process and data flow of the solution including Tablet PC, Console and Portal application.
- Demonstrate Tablet PC application including Exam navigation, completion, signing and submission.

- Demonstrate Console application including Reporting, Dashboard, Re-Score and synchronization functionality.
- Demonstrate Web Portal application including data verification, reporting and printing.

Training conducted:

- Around 40 Instructors/instructors were trained in a quick training session which covered the following:
- Demonstrated *Tablet PC* application including form navigation, completion, signing and submission.
- Demonstrated *Console* application including Reporting and Dashboard functionality.
- We also answered questions about the ability to write on the tablet PCs.
- The instructors were then given a Tablet PC each to practice.
- A training database was setup with dummy candidates and instructors
- The instructors were allowed to complete forms and submit exams for these dummy candidates, so as to get a feel of the exam.

Issues encountered and corrected

During the training exercise, we uncovered an issue. When more than 6 users submitted forms at the same exact time, a deadlock condition arose. To fix this issue, we modified the Tablet PC application to listen to the deadlock error. Upon the occurrence of the error, we resubmitted the form data automatically until the submission was successful. This fixed the issue.

8.2.3 Day 3 Field Testing**Instructors Trial Testing**

The instructors were assigned one Tablet PC each and we signed the Tablet PCs out. The candidates were listed in the Tablet PC application and the evaluators were able to pick them out easily. The instructors used the various search features to select the candidate, and a list of exams available for each candidate was shown. The instructors loaded the skill sheet for the required exam and graded the candidate by starting the timer. The instructors were also able to read out instructions to the candidates by bringing up the instructions on the application. The instructors were also able to bring up scenarios, when necessary, on the Tablet PC using the application

Coordinators Trial Testing

The coordinator was able to track exams as they were being submitted. The coordinator was able to track candidates who failed exams and was able to counsel them immediately and send them to a Re-Teach session, if necessary. The coordinator was also able to track if any candidate failed the ALL SKILLS EXAMINATION, on an immediate basis and he coordinator was able to generate reports as necessary.

Testing Results

A total of **2790** exams were submitted by the end of the All Skills Examination. (This includes the passed and failed exams). The coordinator had very little work except to click buttons to

generate the required reports at the end of the examination. Instructors found the Tablet PC application much easier and faster to use vs. the paper based forms. Instructors noticed the time saved in pulling up the forms on Tablet PC with all the candidate information pre-populated. Instructors felt comfortable writing comments on the Tablet PC. Instructors also liked the auto-populated comments for critical criteria, which reduced the amount of redundant typing required on their part.

Instructors also noticed that the application and wireless environment were very stable with absolutely no issues on the second day of All Skills. Battery life of Tablet PC was down to anywhere from 65% to 80% after 3 hours of usage. Instructors noticed they saved time in not having to count and grade the exam manually, as the application did that for them automatically.

Some issues pointed out to us by the instructors and the coordinator were:

- Need for count of exams by attempt for the candidates.
- Need to fix some typos in the instructions and the scenarios.
- Overall the feedback was very positive.

8.2.4 Additional Functionality Identified and Implemented as a Result of Field Testing

The table below shows additional work needed and later completed by this project.

Additional Functionality Requested	Technical Solution
Need capability to find previous attempts easily	Add a link for the skill on the dashboard. Clicking on the link will take the coordinator to a page which will display all the attempts for the skill for that candidate
Need functionality to import instructors too	Add an import instructor feature similar to the Import Candidates feature, on the Manage Users tab.
Need to be able to create an "Instructor list" for signing Tablet PCs in and out during the All Skills Examination	Add Export to Excel feature to the Instructor List in the Manage Users tab.
Need to have the ability to disable the enforcement of the password policy for the users.	Add a check box on Add User pages to disable the enforcement of password policies.
Need to be able to delete any candidate's exams.	Add a delete button and functionality on the Exams List page.
Need to be able to generate an excel report of the exams not taken by the candidates	Add Export to Excel functionality to the Exams Not Taken report
Need to be able to search Instructors by name	Add Search by Name functionality to the Instructor List in the Manage Users tab.
Need the ability to search candidates by name on the Dashboard	Add Search by Name functionality to the Candidate Dashboard.
The Candidate roster report needs to show the count per attempt for each skill	Add the additionally required counts to the report. Also generate a separate report

	specifically for this.
Column headers on the Dashboard need to be made more easy to understand	Change the Dashboard column headers
Company name needs to contain the number and year	Change the company name on all reports
Spinal Immobilization Supine Patient needs to have "LSB" suffixed to it	Change the name to contain LSB wherever applicable
Spinal Immobilization Seated Patient needs to have "KED" suffixed to it	Change the name to contain KED wherever applicable
"Reteach" stamp should be changed to "RE-TEST/RE-TACH "	Change the image for the same
Instructions and Scenarios need to be updated	Update the html files for the scenarios and instruction
Need to be able to overwrite a passed exam to failed	Change the rescore feature to allow failing a passed exam too

8.3 Final Testing January 2010

Deloitte conducted a train the trainer session and performed field system testing during a four day period. The following personnel were in attendance:

Deloitte Personnel:

Mr. Pawan Singh
 Mr. Raman Singh
 Mr. Devchand Chute
 Mr. Shivaraman Raghuraman

DCMT Personnel:

Mr. Marcus Vigil
 Ms. Chavez
 Cpt. Brookins
 DCMT Instructors



8.3.1 Training and Field Trial

The visit to the client site was scheduled to train a set of end-users (Instructors/instructors) and run the entire ALL SKILLS EXAMINATION using the application for four of the eight teams being tested.

Training:

We set the following training objectives for this trip:

- Train users on the process and data flow of the solution including Tablet PC, Console and Portal application.
- Demonstrate *Tablet PC* application including Exam navigation, completion, signing and submission.

- Demonstrate *Console* application including Reporting, Dashboard, Re-Score and synchronization functionality.
- Demonstrate *Web Portal* application including data verification, reporting and printing.

Field Trial

We also set the following goals for the field testing:

- The instructors use the tablet PC application instead of the paper forms to conduct the ALL SKILLS EXAMINATION for all the eight teams being tested.
- The coordinator uses the EMT Console application to track status and coordinate the ALL SKILLS EXAMINATION, instead of manually compiling the results and generating reports.

8.3.2 Environment and Set Up Day 1 | January 7, 2010

We setup the Tablet PCs for use in the ALL SKILLS EXAMINATION. We charged about 50 tablet PCs completely. We then pointed all tablet PCs to the training server for the instructors to play around with and get comfortable with the system. We trained about 20 new instructors to use the Tablet PC application in a quick training session which covered the following:

- Demonstrated *Tablet PC* application including form navigation, completion, signing and submission.
- We also answered questions about the ability to write on the tablet PCs and also if portable keyboards could easily be used to write comments on the application.
- The instructors were then given a tablet PC each.
- A training database was setup with dummy candidates and instructors
- The instructors were allowed to complete forms and submit exams for these dummy candidates, so as to get a feel of the exam.

We also trained two new coordinators to use the Console application. We then tested the wireless network strength and stability by walking around the building and submitting forms from various parts of the building. The wireless environment, the tablet PC application and the Console application were not changed. We finally received the list of candidates for the exam. We trained the coordinators on the import process and also created a template for the candidate list that could easily be imported into the system. We also added the new instructors into the system.

8.3.3 Day 2 Field Trial Instructors and Evaluators | January 8, 2010

Field Trial -Instructors

The instructors were assigned one Tablet PC each and were signed out to each. The candidates were listed in the Tablet PC application and the evaluators were able to pick them out easily. The instructors used the various search features to select the candidate, and a list of exams available for each candidate was shown. The instructors loaded the skill sheet for the required exam and graded the candidate by starting the timer. The instructors were also able to read out instructions to the candidates by bringing up the instructions on the application. The instructors were also able to bring up scenarios, when necessary, on the Tablet PC using the application.

There were about 1686 forms submitted, amounting to about three and a half skills, by the end of the day.

Field Trial -Coordinators

The coordinator was able to track exams as they were being submitted. The coordinator was able to track candidates who failed exams and was able to counsel them immediately and send them to a Re-teach session, if necessary. The coordinator was also able to track if any candidate failed the ALL SKILLS EXAMINATION, on an immediate basis and the coordinator was also able to generate reports as necessary.

8.3.4 Day 3 Feedback and Results | January 11, 2010

A total of 2571 exams were submitted by the end of the All Skills Examination. The coordinator only had to except by a click to generate the required reports at the end of the examination.

Instructors found the Tablet PC application much easier and faster to use vs. the paper based forms. Instructors noticed the time saved when the Tablet PC pulled up the forms with all the candidate information pre-populated.

Instructors felt comfortable writing comments on the Tablet PC, and Instructors liked the auto-populated comments for critical criteria, which reduced the amount of redundant typing required on their part. Instructors also noticed that the application and wireless environment were very stable with absolutely no issues throughout All Skills test. Instructors noticed they saved time in not having to count and grade the exam manually, as the application did that for them automatically.

Battery life of Tablet PC was down to anywhere from 65% to 80% after 3 hours of usage.

Instructors and coordinators pointed out the following issues to us:

- Need for more generic comments for situations when the candidates failed because of not meeting the minimum score.
- Need to reduce the typos in the instructions and the scenarios.

Overall the feedback was very positive.

8.3.5 Additional Functionality implemented as a result of the trip

Additional Functionality Requested	Technical Solution
Need to be able to track class name for each candidate	Add an additional column called Class to the Candidate Table
Need ability to track which candidates have been called for counseling	Mark the records that have been printed on the list of exams
Need ability to filter the list of failed exams by instructor	Add a filter to the list of failed exams to filter by exams

Need ability to be able to repair the wireless connect from within the application	Place button into the application or re-start the router manually
Instructors must be forced to read instructions to the candidate before beginning the evaluation	Lock the exam from until the instructions to the candidate page is not opened by the instructor
Critical criteria should be automatically checked based on responses to corresponding questions	Check the responses to questions and if it matches requirements, check the corresponding critical criteria automatically
Need for the ability to fail the candidate if time has been exceeded	Add a checkbox in the critical section for time exceeded criteria. Check box should not appear elsewhere
Field Size for username and password fields need to be bigger for easier access	Increase the size of the text boxes required for input
Instructors not aware of minimum score for each skill	Comments need to be automatically added to skill sheet if the candidate does not achieve the minimum score

9 Conclusion

9.1 Strategic Outcomes

The Deloitte approach to this research effort was straightforward with maximum flexibility toward creation of a useable end product.

What the strategy was going in?	How did the strategy work?
Begin with a broad hypothesis	The project was conducted in to one-year phases. During the first phase, we developed the technology and the initial requirements around the hypothesis.. During the second phase, we implemented the requirements into the DCMT system
Develop initial set of requirements based upon the hypothesis	During the second phase, we implemented and tested the initial requirements by building the DCMT system
Work with DCMT personnel to review the initial requirements	DCMT personnel reviewed and approved the resulting set of functionalities provided by the system
Develop the final functionality based upon field testing and adoption of enhancements	During separate field testing trips, we fully tested the functionality and made many enhancements. DCMT are continuing to use the system to enhance their testing processes.

9.2 Performance Results

The table below describes the results mapped to their original hypothesis

Category	Criteria	Results Achieved in the Pilot
1. Increased Efficiency	<ul style="list-style-type: none"> a. reduced paper use and associated storage and management cost b. free up manpower used as runners and processors c. instant scoring/feedback including details for corrective assistance d. decreased time of overall testing process 	<ul style="list-style-type: none"> a. Significant (eliminates paper involved in 10,000+ individual exams/year) b. Significant (eliminated 10 runners + 9 processors per shift, 2 per day, 2 days every other month – 1920 man-hours/yr.) c. Significant (the ability for instant scoring provided more effective training environment allowing the instructor instant access to candidate achievements) d. Significant (30% reduction in time required for testing – from 20 hours to 14 hours)
2. Increased Accuracy	<ul style="list-style-type: none"> a. legible capture of instructor comments b. validation of input prior to submission c. import of student demographics 	<ul style="list-style-type: none"> a. Significant b. Significant c. Significant (instructor comments very positive on this being a substantial time-saver)
3. Administrative Simplification	<ul style="list-style-type: none"> a. enable automated management of performance indicators b. web-enabled access c. automated synchronization of TEMTPC and EMT Web Portal d. digital data sharing capability 	<ul style="list-style-type: none"> a. Significant (includes performance of instructors) b. This feature declined c. Significant d. Significant (decreased processing time and shipping/handling cost)
4. Enhanced Data Security	<ul style="list-style-type: none"> a. encryption during testing process during transfer between instructor to evaluator b. encrypted storage c. encryption for transfer 	<ul style="list-style-type: none"> a. Significant b. Significant c. Significant

9.3 General Comments

This engagement demonstrates our ability to lead a multifaceted, large-scale business process and technology implementation in a highly controlled environment. Deloitte was able to assemble a team with the necessary technology experience as well as the detailed understanding of DCMT processes and policies necessary to succeed on this project. We've applied leading-edge enterprise-service wireless technology to provide an integrated environment for the client without a full-scale replacement of its technology portfolio. The technology, training and solution deployment experience gained on this project will be able to be used to help other health care organizations implement more effective technology in a way that will meet their requirements.

9.4 Recommendations to Expand Utilizations into Other Areas

From a high level, it was obvious that the application and devices were well received by the DCMT users. Our intention was to meet the overall project goals and objectives with an innovative product. Inherent in any research and proof of concept roll-out are both the limitations of the solution and opportunities for expansion. At this point in the operationalization of the tools, the overall system has moved into sustainment. Recommendations are provided below:

9.4.1 Operational Recommendations

Operational recommendations are categorized by the following three components

- a. Hardware – The Tablet PCs and Servers will need to be maintained both from a systems operation point to keep the infrastructure current with latest patches as well as physical security of the devices and replacement when damaged or defective.
- b. Software – The applications loaded onto the laptop could become unstable and need to be re-imaged. Data stored on the servers will need to be backed up with a system restore capability designed and tested to ensure that the overall recovery scheme will work.
- c. Configuration – The system may need to accommodate user generated requests for additional functionality and/or deletion of current ones.

9.4.2 DCMT Expansion

The delivered system could be expanded with additional use cases by adding functionality in each of the hardware components

- Tablet PC's – The current use is limited to conducting the exams. These tools can be expanded for use as training aids for students by simply adding documents, instruction plans and commercial interactive training tools purchased or downloaded from other sources
- Servers – The wireless connections between the server and the PCs could also be used for group training sessions, surveys, etc. as part of an overall training regimen to test while training to determine candidate knowledge and retention.
- Portal – The portal could be expanded to include such things as content management, additional reporting, expanded business intelligence, and performance management. The portal could also be expanded as a recruiting tool and overall knowledge management portal to organize DCMT materials.

9.4.3 Replication to Other Services

The system could be ported to other services by minor changes to the functionality to accommodate individual service needs or other services could send candidates to DCMT for training and certification. Either way, there could be significant potential savings.

KEY RESEARCH ACCOMPLISHMENTS

Automating the testing process improved the efficiency of the Practical Exam administration process and enhanced training effectiveness through adaptive testing and real time feedback on performance.

Piloting the automated process:

- Decreased the amount of time required for scoring the practical exam and provides real-time feedback to students and instructors
- Allowed trend analysis of the results of the exam to identify training deficiencies of the individual as well as the program.
- Provided students additional learning opportunities where they are needed by decreasing the overall amount of time required for the PE.
- Supported the development of a common framework that will automate additional training programs and examinations.
- Enabled a plan for enculturation of instructors into an environment of digitized training.
- Returned soldiers currently used for runners and data entry to productive work and study.
- Identified opportunities for improvements and workflow effectiveness with the use integrated technology

REPORTABLE OUTCOMES

This project has been used by Deloitte as a qualification to show experience in the development of electronic forms and/or secure wireless portal solutions for two winning engagements to date.

CONCLUSION

The reaction of DCMT staff to the pilot implementation of the prototype designed indicates a successful outcome in improving the testing process. The coordinator had very little work except to click buttons to generate the required reports at the end of the examination. Instructors found the Tablet PC application much easier and faster to use vs. the paper based forms. Instructors noticed the time saved in pulling up the forms on Tablet PC with all the candidate information pre-populated. Instructors felt comfortable writing comments on the Tablet PC. Instructors also liked the auto-populated comments for critical criteria, which reduced the amount of redundant typing required on their part.

The measured results also support a successful study – proving gains in efficiency at a level that supports serious consideration for expanded use of the technology used for this study. Specifically, a reduction in the time required for the overall testing process of 30 percent is a major improvement. The reduction of man-hours required measured (more than 1900/year) did not include the time freed up by the reduction in the time for the testing process, it is simply a reduction in needed manpower for runners and processing personnel – the reduction of overall testing time allowed the staff to reduce overtime demands for the first day of testing.

The application of technology to automate paper-based processes is often thought of as expensive due to the initial investment, however the combination of efficiencies gained and the

improved capability for managing data that extends beyond the reach of the original paper-based process is important to consider as well. The pilot allows the course coordinator to evaluate not only students taking the exam, but also to do analysis on test stations and instructors that will provide insight for improving teaching methods and have a definitive impact on the overall outcome of the training program.

The testing and evaluation process for the pilot system provided numerous opportunities for the staff and the Deloitte team to interact, identify potential improvements, take action on those inputs, and resulted in a final product that continues to be lauded by the 68W training program staff.

10 Appendix A



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